DECEMBER

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Changes in Gingival Tissue—*Coolidge*
Full Denture Construction—*Henderson*
Economic Status of Faculties—*Salzmann*
Focal Infection—*Cook*
Pediatrician and Dentistry—*Haynes*
Diet and Teeth—*Hofrichter*
Teeth in Disease—*Lintz*
Carcinoma of Mouth—*Epstein*
Bridgework—*Doxtater*
Vincent's Infection—*Eller & Rein*
Cheek-Plates—*Van Minden*
Origin of Enamel Tufts—*White*
EDITORIALS
Memphis Meeting—Christmas Seals
COUNCIL ON DENTAL THERAPEUTICS
Accepted Dental Remedies
Somnoform—Not Acceptable
BUREAU OF CHEMISTRY
Misbranded Dental Nostrums
BUREAU OF PUBLIC RELATIONS
Bureau Name Changed
Teaching Oral Hygiene—*Durbin*

CONTENTS

G. Walter Dittmar, D.D.S., F.A.C.D. ..... Frontispiece

ORIGINAL COMMUNICATIONS

Inflammatory Changes in the Gingival Tissue Due to Local Irritation.
By Edgar D. Coolidge, B.S., D.D.S., M.S. 2225
What Is the Most Important Factor in Full Denture Construction?
By George H. Henderson, L.D.S., D.D.S. 2271
The Economic Status of Dental College Faculties.
By J. A. Salzmann, D.D.S. 2281
Focal Infection of the Teeth and Elective Localization in the Experimental Production of Ulcerative Colitis.
By Thomas J. Cook, D.D.S. 2290
The Pediatrician and Dentistry.
By Royal Storrs Haynes, M.D. 2302
Diet and Teeth.
By C. H. Hofrichter, A.B., M.D., and May Brossois, B.S. 2310
The Teeth in Relation to Disease.
By William Lints, M.D. 2318
Carcinoma of the Mouth.
By Casper M. Epstein, M.D., D.D.S. 2335
Seventy-Seven Years Ago—An Indictment of the Dental Profession.
By William C. Fisher, D.D.S. 2338
The Importance of Occlusal Coordination in Bridgework.
By Lee W. Doxtater, D.D.S. 2343
Some New Views on Dental Disease.
By William G. Downs, Jr., D.D.S., M.A., Ph.D. 2348
Oral Vincent's Infection—A General Survey of Diagnosis and Treatment.
By Joseph Jordon Eller, M.D., and Charles Robert Rein, M.D. 2352
Vulcanite Cheek-Plates in the Treatment of Habitual Cheek Biting and Cheek Sucking: Report of a Case of Lichen Planus of the Buccal Mucosa.
By F. van Minden 2357
Leukoplakia.
By G. F. Logan, B.S., D.D.S. 2364
The Inverted Tooth Cusp.
By Rupert E. Hall, D.D.S. 2366
A Dental Perspective of Three Hundred Fifty-Five Cases of Gastric Carcinoma.
By Harold Goldstein, D.D.S. 2368
Why Use the Face-Bow?
By J. E. Taft, D.D.S. 2372
An Investigation Regarding the Possible Traumatic Origin of Enamel Tufts.
By Howard T. White, A.B. 2374
Examination of Tooth Cements.
By Max Kulka, M.D. 2379
Dental Economics and Children's Dentistry.
By C. N. Johnson, L.D.S., D.D.S. 2381
Periodontoclasia: A Brushing Technic and Some Pertinent Observations.
By Arthur Samuel Chichester, D.D.S. 2389
The Three-Quarter Crown as a Filling for Anterior Teeth.
By G. M. Fisch, D.D.S. 2393
Prescription Writing in Dentistry.
By Jacob B. Ballin, B.S., Ph.G. 2396
The Value of Bismuth-Violet in the Treatment of Vincent's Infection and Dry Socket: Preliminary Report.
By Malcolm B. Lacy, D.D.S. 2398
Follicular Cyst Associated with an Impacted Cuspid in an Infant: Report of Case.
By Menifee R. Howard, D.D.S. 2401
Tic Douloureux: Report of a Case.
By G. Harold Cole, D.D.S. 2402

EDITORIAL DEPARTMENT

The Memphis Meeting. — The Christmas Seals. — Frank Thomas Breene, D.D.S., M.D. (1866-1931). — James G. Reid, D.D.S. (1855-1931) 2403-2410

COUNCIL ON DENTAL THERAPEUTICS

Accepted Dental Remedies 2411
Somnoform—Not Acceptable for A.D.R. 2412
Absorption of Drugs from the Teeth 2413

BUREAU OF CHEMISTRY

More Misbranded Dental Nostrums 2416

BUREAU OF PUBLIC RELATIONS

Bureau Name Changed 2420
Mouth Hygiene Conferences at the Memphis Meeting.
By George H. Wandel, D.D.S. 2421
Outlines for Teaching Oral Hygiene from the Kindergarten to the Eighth Grade.
By Emma F. Durbin, R.N. 2424

CURRENT LITERATURE

Extracts and Abstracts 2433

MISCELLANY

Book Review 2435
Correspondence 2435
Benefactors 2436
News 2437
Announcements 2437

ADVERTISEMENTS

Index to Advertisements A-53
Classified Section A-47

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President Elect of the American Dental Association

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Original Communications

INFLAMMATORY CHANGES IN THE GINGIVAL TISSUE DUE TO LOCAL IRRITATION*

By EDGAR D. COOLIDGE, B.S., D.D.S., M.S., Chicago, Ill.

THE success of maintaining a high degree of mouth hygiene is to a large extent dependent on the presence of shallow gingival crevices and the absence of marginal inflammation of the gingival tissues.

The depth of the gingival crevices is extremely variable, and it is impossible to define what might be considered a normal depth. The ideal condition would obviously be one in which no crevice could be found between the gingival crest of the soft tissue and its attachment to the surface of the tooth. Such a condition is frequently found clinically and histologically in a healthy mouth, but is seldom found to exist on all surfaces of a tooth and probably never on all teeth in any mouth.

At the time of eruption, as a tooth pushes through the mouth epithelium, a union takes place between the epithelium covering the enamel and the mouth epithelium.[1] The enamel epithelium is not free from the enamel when this occurs, but the cells are actually attached to the cuticle on the enamel surface so that no space exists between the erupting tooth and the soft tissue. Were this not a fact, the moment an erupting tooth pushed through the gum deep crevices would exist in the circumference of the tooth between the crown and the soft tissue and a septic condition would soon appear about all erupting teeth. As the

*Read before Section on Mouth Hygiene at the Midwinter Clinic of the Chicago Dental Society, Feb. 3, 1931.

*From the Research Laboratory (Director, Rudolf Kronfeld), Chicago College of Dental Surgery, Dental Department of Loyola University.

1. Gottlieb, Bernhard: Der Epithelansatz am Zahn, Deutsch. Monatschr. f. Zahnheilk., No. 5, 1921; Tissue Changes in Pyorrhea, J. A. D. A., 14:2178 (Dec.) 1927.

tooth continues to erupt, exposing more and more of its surface, the same relation of the mouth epithelium and enamel epithelium continues, at a level more and more rootward. After the tooth reaches occlusion, a tendency continues for a further exposure of the tooth by a progressive recession of the soft tissues and alveolar crest accompanied by a continuous slow movement of the tooth toward the occlusal plane. At the same time, the mouth epithelium which united with the enamel epithelium at eruption shows a tendency to proliferate along the surface of the crown and root in advance of the receding soft tissue, which gradually becomes detached from the tooth. This separation gives rise to the gingival crevice which lies between the enamel cuticle of the tooth surface and the mouth epithelium which had previously been attached at erupting time. If this separation did not occur or should the surrounding soft tissues resorb or recede as fast as the separation occurs, the gingival crevice would never acquire any perceptible depth. There seems to be a tendency for a rather narrow free margin of epithelium to surround each tooth, with a corresponding shallow crevice between it and the tooth.

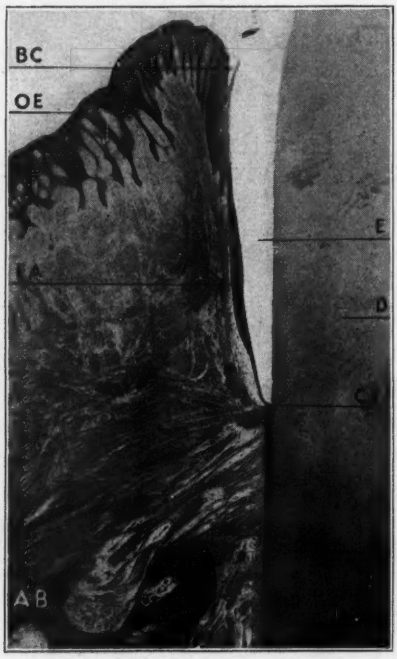

Fig. 1.—Distal surface of upper cuspid of boy, aged 14. *E*, enamel. *D*, dentin. *C*, cementum. *OE*, oral epithelium. *BC*, bottom of gingival crevice. *EA*, epithelial attachment. *CEJ*, cemento-enamel junction. The epithelium is attached to the enamel from *BC* to *CEJ* (very shallow gingival crevice). *AB*, alveolar bone.

The location of the bottom of the gingival crevice varies at different ages; but, at all times, the epithelium extends below the level of the crevice at the attachment to the crown or cementum. These histologic findings, introduced by Gottlieb, have been discussed at considerable length by Skillen and Mueller,[2] Orban and Mueller,[3] Skillen,[4] Becks,[5] Kronfeld[6] and others. It has been shown that the bottom of the crevice may be located on the enamel surface in youth and later in life may be found on the root surface.

2. Skillen, W. G., and Mueller, Emil: Epithelium and Physiologic Pocket, J. A. D. A., 14:1149 (July) 1927.

3. Orban, Balint, and Mueller, Emil: Gingival Crevice, J. A. D. A., 16:1206 (July) 1929.

4. Skillen, W. G.: Normal Characteristics of Gingivae and Relation to Pathology, J. A. D. A., 17:1088 (June) 1930.

5. Becks, Hermann: Normal and Pathologic Pocket Formation, J. A. D. A., 16:2167 (Dec.) 1929.

6. Kronfeld, Rudolf: Epithelial Attachment and So-Called Nasmyth's Membrane, J. A. D. A., 17:1889 (Oct.) 1930.

In the former case, epithelium is still found attached to the enamel and not extending down on the cementum, while, in the older person, epithelium is usually attached only to the cementum, having grown downward exposing the entire crown and often a part of the root surface as well. While such changes in the normal topography of the epithelium may be slow and regular, like a physiologic process, it is seldom that an individual may exhibit these changes without the complication of some inflammatory reaction in the underlying connective tissue.

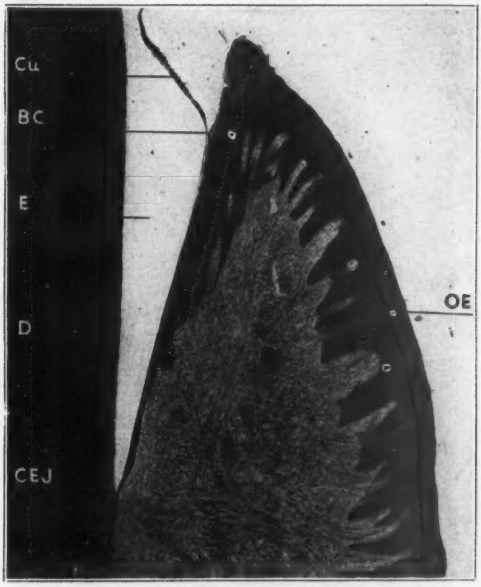

Fig. 2.—Lingual surface of cuspid of young monkey. *E*, enamel. *D*, dentin. *CEJ*, cemento-enamel junction. *OE*, oral epithelium. *BC*, bottom of gingival crevice. *Cu*, enamel cuticle.

In Figure 1, a tooth of a young individual, there is a very healthy condition of the gingival tissue. The mouth epithelium unites with the enamel epithelium quite high on the enamel, to the lower third of which the epithelium is firmly attached down to the point of junction between the enamel and cementum. It is evident that the crevice is very shallow and the bottom of the crevice is high on the enamel surface. The submucosa shows no inflammation. The fibers of the periodontal tissue can be seen at their attachment to the highest point of the cementum. The crest of the alveolar process is in a typical relation to the cementum on the surface of the root, which indicates a normal functional relation between the periodontal fibers, bone and cementum.

A very similar condition, in a young monkey, is shown in Figure 2, with higher magnification. The very healthy gingival tissue is firmly attached to the

enamel and a shallow crevice shows slightly below the crest of the soft tissue. The cuticle in this case has remained, but the enamel was, of course, lost in the process of decalcification and the bottom of the gingival crevice is very easily seen high on the enamel surface between the loose end of the cuticle and the mouth epithelium. The underlying tissues show or injury of the gingival crest. There is no evidence of calculus present to irritate these tissues, and therefore no inflammation is seen in the submucosa.

The picture of the partially erupted tooth of a monkey is shown in Figures 3 and 4. A metal cap had been cemented upon this tooth for an investigation relating to orthodontia. A shallow depression

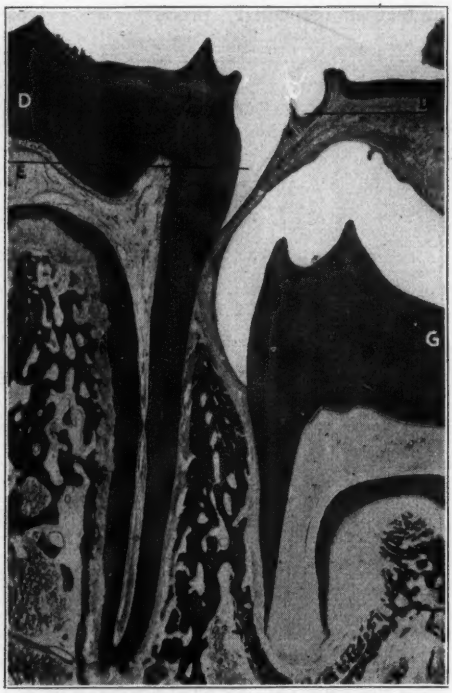

Fig. 3.—Recently erupted lower first permanent molar of young monkey. *G*, germ of unerupted second permanent molar. *E*, enamel. *D*, dentin. *De*, depression in soft tissue made by cap which was cemented over first molar crown and worn for several weeks by monkey.

an ideal condition. The epithelium is attached to the enamel as far as the cemento-enamel junction.

At the youthful age of this individual, there has been little mechanical irritation is found near the crest of the tissue where the edge of the band rested. Slightly farther down on the enamel surface, the bottom of the gingival crevice is seen where the epithelium is separated from

the enamel cuticle. The crevice is filled with leukocytes and pus. The underlying tissue is infiltrated with inflammatory round cells. The epithelium below the bottom of the crevice is attached to the enamel, and the inflammation gradually disappears toward the cemento-enamel junction.

the gingival crevice. Because of the short time that the band was on the tooth, only a localized inflammatory reaction is seen and little damage has been done, but evidently a new factor has entered in. Little tissue change could be noted on the surface, but a definite pathologic process is detected by microscope and the cause is

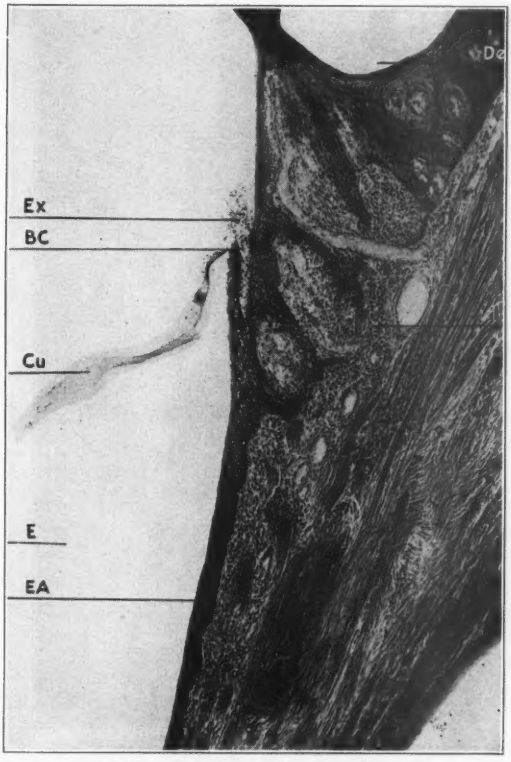

Fig. 4.—Area *x* from Figure 3. *BC,* bottom of gingival crevice on surface of enamel *E. Cu,* enamel cuticle. *De,* depression in soft tissue made by edge of cap. *I,* retro-epithelial inflammation due to irritation of edge of cap. *Ex,* exudate (pus) escaping into gingival crevice. EA, epithelial attachment.

It is evident that the presence of the band caused the inflammatory reaction, with a subsequent production of pus in

known. It is interesting to see the high epithelial attachment in this case in spite of the irritating margin of the band rest-

ing upon the epithelium higher up along the surface of the crown.

In an examination of many mouths, only a small percentage will be found free from marginal inflammation. Black[7] reported that in 500 mouth examinations, only 5 per cent were found to be free from marginal inflammation. In the other 95 per cent, he attributes slightly less than one half of the gingivitis to dental calculus and slightly more than half to injuries of the gingival tissues from food packs, bad margins of fillings and inlays, impinging margins of crowns, bridge pontics and removable prosthetic appliances, malposition of teeth and dental caries. Dental calculus was found to be the cause of gingivitis in about 45 per cent; imperfect dental operations, 37 per cent, and irregularities of form and position, 18 per cent. Gottlieb and his as-

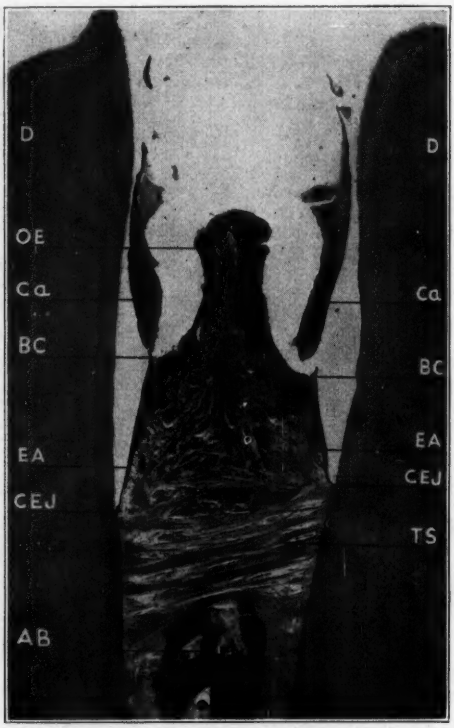

Fig. 5.—Interproximal tissue between upper central and lateral incisors of boy, aged 14. *E*, enamel. *D*, dentin. *CEJ*, cemento-enamel junction. *AB*, alveolar bone. *TS*, transseptal fibers of periodontal membrane. *OE*, oral epithelium on crest of papilla. *EA*, epithelial attachment extending to cemento-enamel junction. *Ca*, calculus in gingival crevice bottom of which is at *BC*.

7. Black, G. V.: Special Dental Pathology, Chicago: Medico-Dental Publishing Co., 1915.

sociates claim 90 per cent of all "pyorrhea" (including gingivitis) is *Schmutz-pyorrhoe* or "filthy mouth pyorrhea." This is about the same as the percentage given by Black for all causes.

The papilla between two teeth of a young individual is seen in Figure 5. The epithelium is still attached to the enamel, ending at the cemento-enamel junction.

and, in many places, the epithelium barely covers the underlying tissue. No damage has occurred in the deeper periodontal tissues as yet. The transseptal group of fibers shows very distinctly, stretching between the two teeth just below the enamel surfaces, and the alveolar crest is high and normal in appearance.

In Figure 6, the epithelium is entirely

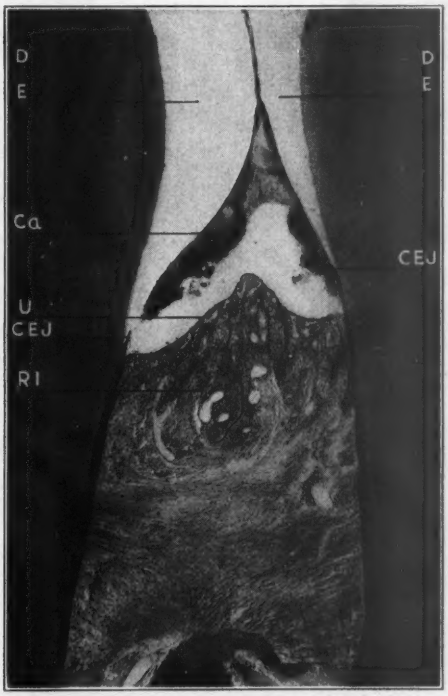

Fig. 6.—Molar teeth of young monkey on which a cap was placed covering these teeth and several others. The cap remained for several weeks on these teeth. *E,* enamel. *D,* dentin. *CEJ,* cemento-enamel junction. *Ca,* calculus, pus and food crowded beneath cap and between teeth. *U,* ulcerated surface of interdental papilla due to unhygienic condition. *RI,* round-cell infiltration and enlarged blood vessels.

The bottom of the gingival crevice is seen to be on the enamel surface of each tooth and a mass of calculus lies in each crevice. The crest of the papilla appears pinched

below the enamel and is attached below the cemento-enamel junction to the cementum. Calculus and soft deposits nearly fill the interproximal space, while

the interdental papilla is flattened virtually to a plane surface. The epithelium as well as the underlying tissue shows a very unhealthy condition: round-cell infiltration, enlargement of the blood vessels and edema. In this case, a cap covering three teeth had been cemented to place and left on for several weeks. Food and calculus accumulated in the interproximal embrasures and caused this unhygienic condition. No deep crevices were formed; rather, necrosis of the epithelium took place, with inflammation extending into the connective tissue below. Even at this early stage of inflammation, tissue changes have begun in the alveolar bone.

The condition shown in Figure 7 is quite different. Here, the enamel surfaces had been lost by caries, which had penetrated into the dentin. A great mass of food and calculus is packed between the two teeth and has flattened the papilla

Fig. 7.—Interproximal tissues between two molars of man of middle age. *D*, dentin showing caries where enamel surfaces were lost by decay. *FP*, food pack between teeth. *P*, interproximal papilla entirely pressed down by food pack. *EA*, epithelial attachment to cementum.

down along the root surfaces. A thin layer of epithelium is seen attached to the cementum, but does not extend very far down on the root. The very shallow crevices indicate marked resistance of the tissue to the irritants. Such natural resistance as is shown by the lack of deep crevices in this case, although there has been much loss of tissue, is favorable to mouth hygiene. The correction of such a condition is easily accomplished since there are no deep crevices. It depends simply on the proper restoration of the two approximating surfaces and the contact point, after which the epithelium is replaced, forming a more normal papilla.

This illustration is typical of what occurs in the presence of food packs, although, in some instances, a tendency for a deep crevice to develop is frequently found where such food packs occur. Quite often, a pocket occurs at a later stage than is shown here. Deep pockets usually form only after a considerable

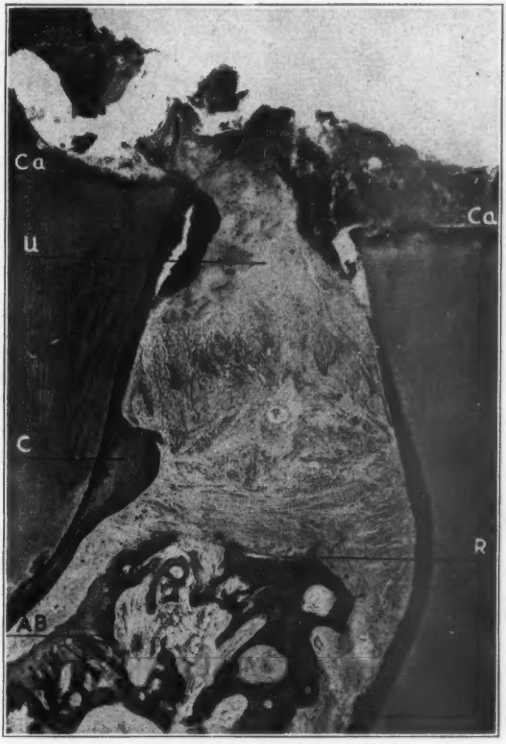

Fig. 8.—Interproximal tissue between upper second and third molar tooth, crowns of which were entirely broken down by caries. *Ca,* caries. *U,* ulcerated surface of interdental papilla covered with necrotic tissue, pus and débris. *C,* cementum hyperplasia. *AB,* alveolar bone. *R,* area of resorption on crest of alveolar bone.

loss of alveolar bone has taken place. Alveolar atrophy occasionally begins with the early stages of gingivitis, but more frequently develops during a chronic gingivitis.

An extremely bad condition is shown in Figure 8. Both crowns have decayed down to the gum margin and the necrotic surface of the epithelium is sloughing. The effects of the sharp edges of the decayed teeth can be seen where these edges indent the soft tissue. Lower down, the epithelium is attached to the cementum on each root. On one root, the strong resistance against the downward growth of epithelium is indicated by a large protuberance of cementum. The presence of this cementum hyperplasia is evidence of cementoblastic activity. Epithelium spurs shoot downward wherever the cementum becomes bare. The alveolar bone appears very porous, with unusually large marrow spaces. In these enlarged marrow spaces, the bone marrow is undergoing fibrous changes. The outer border of the process shows much resorption by osteoclasts. The resorbing of the alveolar crest has probably been caused by the loss of function of the teeth, together with the severe inflammatory reaction in the soft tissue. The periodontal fibers have mostly disappeared and the tissue shows degeneration and dense infiltration.

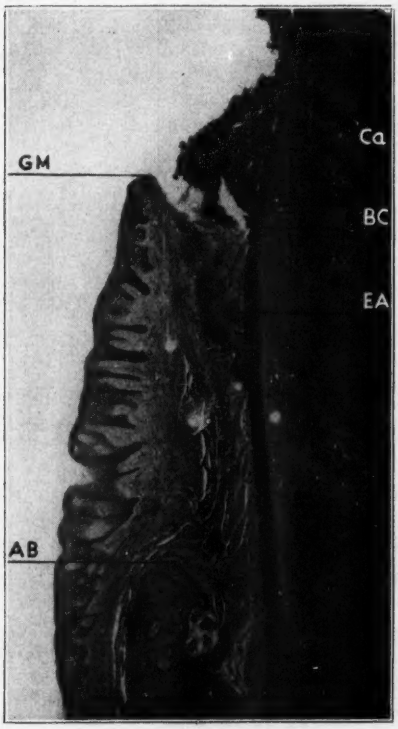

Fig. 9.—Lingual surface of lower central incisor. *Ca,* dental calculus lying against cementum from which epithelium has been separated. *EA,* epithelium attached to cementum. *BC,* bottom of gingival crevice. *GM,* lingual gum margin showing flat ulcerated surface from *GM* to *BC,* due to presence of calculus. *AB,* alveolar crest. Only a loss of superficial tissue results from the presence of exposed calculus.

Figure 9 shows dental calculus of the common exposed type resting upon the lingual surface of a lower incisor tooth. It can be seen that the soft tissue does not cover all the cementum. Only a very shallow crevice is present in the epithelium, which is attached to the cementum, extending only a short distance down the root. The surface of the epithelium underneath the calculus shows leukocytes and a little suppuration. The submucosa and the tissue lower down both show a mild inflammation, but no marked change has taken place except the gradual receding of the soft tissue along with the continual downward growth of the epithelium. The effect of the calculus in this case has been to depress the tissue and produce a superficial irritation sufficient to cause a loss of epithelium but accom-

panied by little suppurative exudate or pus.

A more unhygienic condition is shown in Figure 10 on the buccal surface of an upper third molar. A large mass of calculus rests upon the surface of the root just below the enamel. The epithelium beneath the calculus is mostly lost, but what remains can be seen extending outward from the cementum in a thin band with a necrotic surface. Much infiltration is present in the underlying tissue. Practically no crevice or pocket has been caused by the calculus. The presence of calculus does not always cause pocket formation, but it may be deposited in a pocket or deep gingival crevice if one is present. The presence of calculus on a tooth impinging on the gingivae usually causes necrosis of the superficial tissue leaving a blunt edge which bleeds easily on disturbance.

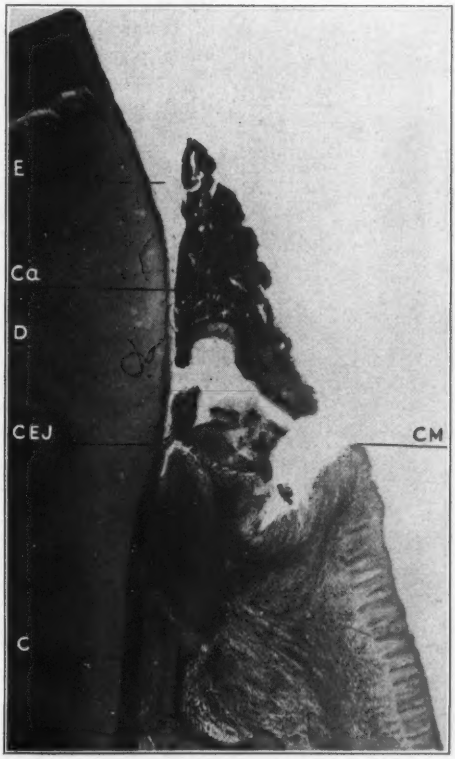

Fig. 10.—Buccal surface of upper third molar. *E*, enamel lost in decalcification. *D*, dentin. *C*, cementum. *Ca*, calculus resting against enamel space to cemento-enamel junction at *CEJ*. *GM*, buccal gum margin with inflamed and necrotic surface. No gingival crevice is present although extensive superficial inflammation exists.

An example of subgingival calculus is seen in Figure 11. Here, the epithelium is entirely below the enamel on the root surface. A deep crevice is filled with the type of calculus which has usually been called serumal calculus. When deposits of calculus settle in a deep crevice, the epithelium almost or entirely covers the deposits and, under this cover, the mass gradually becomes compact and hard.

Fig. 11.—Lingual surface of lower bicuspid. *D,* dentin. *C,* cementum. *Ca,* subgingival calculus, usually called serumal calculus. *GM,* gum margin. *BC,* bottom of gingival crevice. *CT,* connective tissue showing much infiltration of round cells. *AB,* alveolar bone showing resorption along outer border.

Frequent bruises on the soft tissue cause minute hemorrhage, allowing the escape of red blood cells, which later disintegrate. Hemoglobin, the coloring matter of the red blood corpuscles, is responsible for the variety of color common to subgingival calculus, according to Kirk.[8] Just as a bruise on the soft tissue is first red and later becomes darker as a result of chemical decomposition of the red blood pigment, so subgingival calculus absorbs pigment from decomposing blood, which gives to it a characteristic dark gray, brown or green hue. It is quite likely that decomposing albuminous substances in gingival crevices and pyorrhea pockets furnish a certain amount of hydrogen sulphid which unites with hemoglobin to form a greenish brown stain similar to that seen on children's teeth.

It is easy to appreciate the commoner cause of irritation from the subgingival type of calculus. Lying beneath the surface, it is an ever-present foreign body until dislodged and removed. Being continually bathed in saliva and tissue exudate, it furnishes a most favorable medium for bacterial growth and soon pus escapes from the crevice. The underlying tissue suffers from infiltration of round cells and leukocytes and soon inflammation spreads deeper down into the tissue along the periodontal fibers, or, as shown in Figure 12, along the outer border of the alveolar process. Much of the alveolar process has been lost by rapid osteoclastic resorption. Had the inflammatory reaction passed down the periodontal space instead of outside the process, it would have been more disastrous to the supporting structure. The support of the tooth depends on the width of the periodontal space, the height of the al-

8. Fones, A. C.: Mouth Hygiene, Philadelphia: Lea & Febiger, 1921, p. 164.

veolar crest and the length of the exposed surface or the clinical crown, as it is termed by Gottlieb. In this case, the exposed part of the tooth consists in more than the crown since part of the root surface is exposed and the alveolar crest is considerably lower than normal, but the periodontal space is narrow, which is very favorable to the support. Had the direction of the inflammatory reaction led between the cementum and alveolar bone, the periodontal space would have been widened by bone resorption and the support of the tooth would have been weakened. Then, the tooth would have moved back and forth in its socket under occlusal stress and a deeper pocket would doubtless have developed along the side of the root. Just why the reaction has been entirely on the outer side of the alveolar bone it is difficult to explain. The lymphatic drainage of the inside of the epithelium lining of the gingival crevice has been described by Noyes[9] as passing through the ligamentum circulare into the peridental membrane, but in this case the reaction appears to be along the outer border of the alveolar process.

A healthy condition of the epithelium with a shallow crevice is illustrated in Figure 13, taken from a young individual, and in Figure 14, taken from an older individual. In Figure 13, the epithelium is attached to the enamel and extends down on the cementum slightly, with the

Fig. 12.—Area near crest of alveolar bone shown in Figure 11. *C,* cementum. *AB,* alveolar bone showing resorbed area *(R)* along outer border but not along inner border. *RI,* round-cell infiltration in connective tissue extending on outer border of alveolus spreading into deeper tissue. *PM,* healthy periodontal membrane.

9. Noyes, F. B., and Thomas, N. G.: Dental Histology and Embryology, Philadelphia: Lea and Febiger, 1921, p. 195.

bottom of the crevice of the enamel. In Figure 14, the epithelium is attached to the cementum with the bottom of the crevice also on the cementum. If the crevice can always be kept shallow, the mouth can be kept in a better state of hygiene. Another important fact, recently brought out by Orban,[10] is illustrated in these two cases. It has been the opinion of authors and investigators in histology that the epithelium of the mouth had no hornified layer of cells on the outer border. Orban demonstrated that healthy, firm papillae have an hornified layer, while the swollen, soft papillae seen in gingivitis have no hornified layer. He also demonstrated that by proper brushing of the gums and teeth after scaling and polishing the teeth, the hornified layer might be developed where it

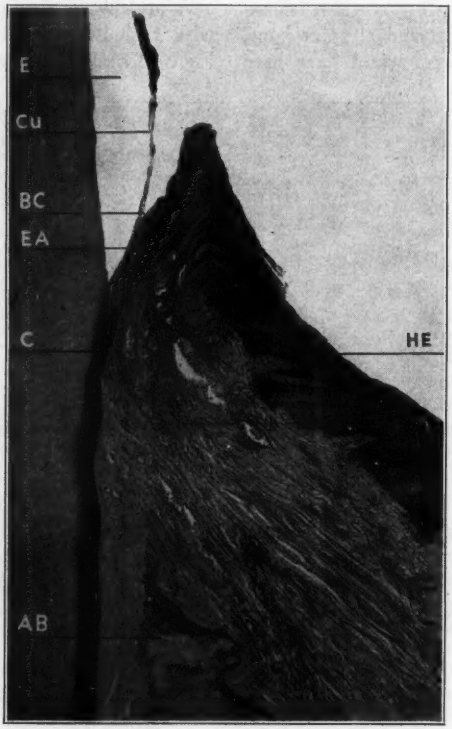

Fig. 13.—Healthy gingival tissue about central incisor of young adult. *E*, enamel space. *Cu*, cuticle. *BC*, bottom of shallow gingival crevice. *EA*, epithelium attached to enamel and extending down on cementum to *C*. *HE*, hornified surface of mouth epithelium. *AB*, alveolar bone.

10. Orban, Balint: Hornification of the Gums, J. A. D. A., 17:1977 (Nov.) 1930.

had previously been destroyed by inflammation. He closes his discussion with the following statement:

In all the cases in which clinically the gum was healthy and it proved to be so in the microscopic examination, we found more or less evident genuine hornification with production of keratohyalin granules and a horn layer without cell nuclei. Therefore, we have to consider genuine hornification as the normal and ideal and should attempt to produce it by our prophylactic measures, i.e. scaling and teaching the patient a rational tooth-brushing method, with massage of the gums. A normal and properly hornified gum is firm and pale pink, and tightly attached to the teeth, and does not bleed under common mechanical insults.

This contribution to the literature is of great value in relation to mouth hygiene. That a hard, resistant protective layer of tissue can be developed on the gums and gingivae by proper treatment and daily care is exceedingly promising.

Fig. 14.—Healthy gingival tissue of upper bicuspid of older individual. *D*, dentin. *C*, cementum. *BC*, bottom of very shallow gingival crevice. *EA*, epithelium attached to cementum on root surface. At this stage, the soft tissue has entirely receded below the cemento-enamel junction. *HE*, hornified surface of mouth epithelium.

It is very evident that Figures 13 and 14 show the hornified layer of epithelium, and this fact, added to the fact that favorable shallow crevices exist around these teeth, indicates that there is a healthy type of tissue relation at different ages, regardless of the fact that more of the tooth is exposed in one than in the other. The relative location of the gingival tissue surrounding the teeth is not of so great importance to mouth hygiene as the character of this tissue. The ideal gingival crevice is one of insignificant depth, and our attention should be continually directed to care of the soft tissue to maintain shallow gingival crevices.

A large percentage of all mouths can be kept in a hygienic condition by the correction of faulty and open contacts, by removing rough and overhanging margins of fillings and other dental restorations and by the control of dental calculus. The greatest problem that confronts us in this field is to control the condition of the saliva, which is responsible for the continuous settling of mucinous and calcific deposits on the teeth and in the gingival crevices.

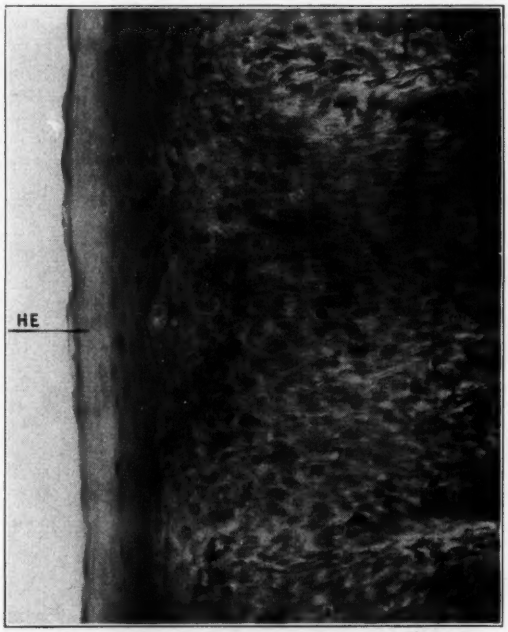

Fig. 15.—Higher magnification of hornified surface of mouth epithelium shown in Figure 14. *HE,* hornified surface where nuclei of epithelial cells have disappeared; most favorable condition for mouth hygiene.

WHAT IS THE MOST IMPORTANT FACTOR IN FULL DENTURE CONSTRUCTION?*

By GEORGE H. HENDERSON, L.D.S., D.D.S., Chicago, Ill.

IN an artificial denture, the most important factor is the one that we are working on at the moment, and neglect to perform each step in construction to the very best of our ability makes the finished case inferior to what it should be. This idea has often been presented, and three dentists answering an inquiry recently published as to the most important factor in full denture construction gave this as their opinion. The majority of those who sent in an answer mentioned the impression as at least a very important factor.

The patient should give a concise history of the mouth, telling, if edentulous, how long ago the teeth were lost; how many sets he has worn or tried to wear; the condition of the teeth before extraction, and also whether he had worn bridges or crowns or had abscessed teeth, or pyorrhea, and the treatment for these conditions. The patient should also give a concise expression of his ideas about artificial teeth and say what he anticipates when he gets the denture he is asking you to make. This examination of the patient's mental attitude should be thorough and is just as important as the examination of the mouth, which should follow. After this, you should explain what you expect to do for the patient and be explicit in telling him as best you can your hopes and desires. Then you should state your fee and your terms, which should be 50 per cent when the case is started and the remainder before the teeth are taken home. If unable to meet your terms, the patient has an opportunity to suggest something different.

The impression largely determines the fit and comfort of a denture, while the proper set-up of the teeth insures masticatory efficiency. Without an impression well adapted to the tissues no denture will be comfortable. The set-up or articulation of the teeth has nothing whatever to do with success in attempting to bite into an apple. It is only when food allows the lower teeth to come in contact with the upper that the question of the articulation of the teeth plays its decidedly important rôle. Without a proper articulation of the teeth, we have not a good denture. We may have good occlusion, which would enable us to open and shut the mandible and to crush our food, but without articulation beyond this stage.

I can see no reason for being satisfied with a poor impression and then spending much time trying to obtain good articulation, any more than I can think it wise to spend much time on a good impression and then not try to get a good set-up of the teeth. Every point, from getting the patient to cashing the check as our reward for trying to make an artificial denture, is just as important as

*Read before the Section on Full Dentures at the Midwinter Clinic of the Chicago Dental Society, Feb. 3, 1931.

any other, because no matter how good a denture we may make, if the patient seeks some reason to complain in order to keep back a part of the money, he will surely find an excuse to belittle the success from his standpoint. On the other hand, if we are rewarded with the fee we asked, there is no excuse for our refusing to see that all legitimate claims of the patient are honored, even to the extent of remaking the case. Therefore, until all reasonable claims are satisfied and the fee is paid in full, an artificial denture is not finished.

From the average patient's point of view, comfort, efficiency and esthetics are, in the order named, the most essential features of a denture. With some of them, any one of these points that does not satisfy will make the whole case a failure. Before the patient can tell that the first two of these points are assured, he has looked in the mirror, and his opinion of the esthetics is often conclusive. We can have a correct impression with the wrong bite or a wrong set-up of the case; or we may have the correct impression, bite and set-up of the teeth, but the lips may be too short, and this would spoil the appearance of the case. The base of the denture may not harmonize with the features, and this also would result in disappointment.

The first basic divisions into which we classify the taking of impressions are: surface impressions and compressed impressions.

By a surface impression, we mean the taking of an impression under the least possible pressure. When this type of impression is used to make a denture, and when the pressure of the mandible is forced against this denture, in the various spots where the tissues are thinnest there will be undue pressure on the hard areas underneath, with the inevitable result of resorption.

On the other hand, an impression taken under pressure may be correct or otherwise, according to the manner of applying pressure against or upon the tissues.

Another consideration in taking impressions is as to whether we should have equal pressure over the whole surface-bearing area. If we get an impression by pressing, say, 5 or 10 pounds to the square inch against the tray, causing this equal pressure over its area, we would naturally compress the soft tissues of the mouth where they are the thickest more than in the thinner areas. When the finished denture is forced to place by mandibular pressure, the thicker, softer areas would be compressed a greater distance than the thinner area. When the pressure of the mandible is removed, the spring or rebound of these thicker areas might allow the air to get under or pass by the seal at the periphery and such a plate would drop. Our theory is that we should get an equalized pressure over the harder areas of the mouth, with enough compression over the softer areas for stability, but not sufficient to produce the spring or rebound above referred to when the pressure is removed. If a small amount of air gets under an upper denture, the latter will drop, regardless of how the impression was taken or of the material of which the denture base was made.

Another basis on which impression taking may be divided is the open mouth versus the closed mouth technic.

Each of these technics has advantages peculiar to itself, but, in my opinion, the advantages of the closed mouth technic are much to be preferred over those of the open mouth technic.

By the open mouth technic, an impression is taken by the operator holding the tray and impression material in place in the mouth, using any material that he desires. When it is completed, he makes a cast. Later, he obtains the bite by one of the various methods in common use.

By the closed mouth technic, the impression, in a single case, or the impressions, if for full dentures, are held in place by the opposing jaws. The bite should be taken at the same time. In my opinion, the closed mouth technic, when carried far enough to obtain the bite, is more likely to give a correct impression and bite than the other method. One reason for this is that, in the open mouth technic, the operator holds the impression, while the patient holds the bite, and seldom is the pressure on the tissues equal or nearly equal in these two stages. My theory is that the pressure on the tissues under an impression, a bite and trying-in, if we use the last to correct the bite, should all be taken under the same pressure. The use of the bite commonly known as a "mush bite" is definitely the worst method of all; yet, in conversation with several good laboratory men, I was informed that 50 per cent of the bites coming to their respective laboratories were mush bites, and according to one man, 75 per cent. Is it any wonder that some members of our profession have said that 50 per cent of lower dentures made are not worn? If this statement is true, is it right that these poor substitutes for the natural teeth should be called artificial dentures? Do you not think that, with due deference to Dr. Anthony and the Committee on Nomenclature of the American Dental Association, it is wrong to call such inferior substitutes by that high sounding name? Should they not be given the name by which they were known for so many years—false teeth, or even plates? Before such substitutes can truthfully be called artificial dentures, they should have a much better rating than the so-called false teeth.

To be called artificial dentures, they should be comfortable when worn night and day. The function of mastication should be restored to as nearly 100 per cent as possible.

The normal contour of the face should also be maintained as far as it can be done.

The teeth should give a pleasing expression to the face; and all these points combined should make a happy patient, who believes a real artificial denture is not a poor substitute for natural teeth, but one regarding which there is no just cause for complaint.

A prospective patient should be told that we cannot promise a 100 per cent denture; that the best that we can do for any endentulous patient is to give him as nearly a 100 per cent denture as the conditions of the mouth will warrant.

Following are some of the causes of failures of dentures:

1. Pyorrhea which is allowed to continue until the cervical one third of the length of the root or roots lose the surrounding process.
2. Surgical removal of the teeth which leaves the ridges in such shape that the correct positioning of the artificial teeth causes so much leverage that normal stability of the denture is impossible.
3. Undue compression of the impression, which will cause resorption of the process when the denture is completed.
4. Faulty occlusion.
5. The use of porous base materials.
6. The wearing of a full upper denture occluding with a few anterior teeth in the lower; or the opposite.

7. The wearing of a full denture occluding against a unilateral artificial substitute which is not supported by natural teeth.

8. Any other condition or combination of occlusal forces that is apt to cause a rocking occlusion.

9. Formation of cicatricial tissue the result of pyorrhea or surgical treatment.

10. Surgical treatment of the mouth, or pyorrhea, causing the separation or division of many nerves in the soft tissues which leave nerve endings that, when pressed by the denture, develop considerable pain.

In their sales talk regarding some partial restoration that they are trying to sell a patient, some dentists tell alarming tales about the experiences of many people who have tried and have failed to wear lower dentures. Fear of the inability to wear dentures is a potent factor against any patient's success; it also causes them to postpone the extraction of their remaining natural teeth until the mouth is often in such condition that it is almost impossible to make serviceable dentures for them.

Teeth that are not paid for in full seldom satisfy the patient. A friend came to my office lately for the first time. I found three posterior bridges and one central bridge, which was loose. I had known the patient over two years, and she had what seemed to me an unnatural curve to her face. I found the following condition: Apparently, the first bridge had been made too short and the bite was evidently about 3 mm. to the right. Later, the other bridges followed the same bite. When she closed her teeth, there was too much force on the anterior teeth, which was making the upper ones protrude. The mandible was made to slide into this unnatural position on account of the lateral bite. When this patient loses all her remaining teeth, which she expects to do soon, how long is it going to take her to get the mandible back into its normal position?

One erroneous idea relative to dentures, frequently held, is that because a denture can be called a sticking denture, it does not necessarily follow that it is adapted to the tissues. I have had all types among the fifty and more varieties that have been made for my mouth. While the majority of them have been so good that they caused no discomfort, have remained in place under all strains of mastication and could be classed generally as 100 per cent dentures, I have had some that, when worn two days and nights, would cause great pain. I had one set that when worn one day would have to be relieved at night. Good prosthetists, who examined these plates, could give no reason for the trouble I was having, nor could they pick these troublesome dentures from my many varieties. The patient is the only person who can tell whether a denture is comfortable.

Apparently, some operators wish to move the soft tissues about as much as they possibly can to make an air-tight peripheral seal, or perhaps we had better say a tissue-tight peripheral seal, which will exclude the air. When this is done, no matter whether the remainder of the tissues are properly compressed or not, the plate made from this kind of impression may remain in place unless dislodged by the occlusion of the opposing teeth or loosened by muscular action. We know that a rubber cup can be attached against a flat glass surface by making a peripheral seal and it will carry a load altogether out of all proportion to its area. A great many plates are made after the idea of this rubber cup; but can we say that they

could by any stretch of imagination be called tissue-adapted dentures?

What do we mean by a tissue-adapted impression?

After all is said and done, it is the hard bones of the maxilla and mandible that support the dentures. These bones are covered by the soft tissues of the mouth, which are of varying thicknesses and density, and which act as a pad or cushion between the hard bones and the hard base of the dentures. It is, therefore, easily seen that it is only the way the soft tissues are manipulated that makes the difference between the various methods and materials by which these impressions are taken. Does it not seem logical that we should obtain a registration of these soft tissues under the same compression as they would be under when we masticate food with the finished dentures, since this is the function wherein the greatest stress is exerted? Any opening made through the palate of a denture that causes it to fall is evidence that the plate is not a tissue-adapted denture; yet, if the plate does not fall, it does not prove that it is a tissue-adapted denture, except as regards the direct area of this opening.

An impression material should be one that can be worn in the mouth for a reasonable time without deterioration, which requires the closed mouth technic. It should change according to the pressure that is exerted upon it, and this pressure should not be less than that ordinarily used in mastication. It should permit of removal without danger of distortion; and it should answer all the requirements that the tissues need to assure equalization of pressure over the harder surfaces of the mouth, with sufficient pressure for stability over the softer areas.

The wearing of the impressions for a sufficient length of time gives the patient confidence in their stability and comfort, allows him and his friends to see them in the mouth, shows him the new profile of the face, and overcomes the doubt he had about being able to wear lower dentures. Confidence is a wonderful asset for the patient to develop at this time. One of my patients said lately, "The impressions just seemed to grow into the tissues of the mouth, and every hour I wore them they felt better." When we intend to open the bite for a new denture much beyond the old bite, there is nothing that will lead the patient to understand why there are changes in his appearance and that will develop his confidence in your statements, like wearing the impressions; and the longer they are worn in reason, the more assurance he will have.

To my knowledge, there are only two materials that will allow the wearing of the impressions long enough to assure this continuous change in the impressions, and they are compounds as we usually call them, and compounds of waxes.

E. Byron Kelly is, as far as I know, the greatest exponent of the wearing of compounds. He says, "Mouth tissue is the greatest factor in the constructing of artificial dentures." He uses what he terms "continuing impression technic." To quote from one of his articles: "I know of no way by which you may be able to correctly register the action of the soft tissues and muscles, which are so important in denture retention, except by an adjustable impression base in the mouth long enough to properly record the tolerance of the tissues."

Dr. Kelly, in his difficult cases, uses modeling compound under temporary dentures. In his technic, the patient may be required to have the compound

in the mouth for weeks and even months before the completion of the impressions.

The Everett fluid wax impression compounds will answer all the requirements of these modern corrective impression technics when properly handled. The technic is very easy to understand and the results are all that we can hope to obtain.

While it is true that we can use an old denture as a tray to take a wax impression, it is, I think, better to take a reasonably correct impression in compound and make a vulcanite tray, in the majority of cases.

In the upper, we want sufficient area to reach slightly beyond the hard palate. We relieve the palatal area and sometimes the ridge, if it is a first impression, to leave room for the waxes.

In the lower, we get also a compound impression and extend it below the mylohyoid ridge wherever the case shows room in that area. These extensions are taken one at a time, and, when the impression is removed, the extension is straightened up or pushed toward the tongue so as not to leave an undercut. I have found that the great majority of my patients can tolerate or utilize some of this extension, and even a little is better than none. I have worn this downward extension for about six years. While some men who have never worn dentures think that it is not needed, I would not think of wearing a denture without it. This extension can in many cases be carried between the tongue and the floor of the mouth. One valuable reason for this extension is this: Should the lower denture rise from any cause, this extension will carry it to place without any chance of its getting crosswise of the ridge. This fact alone adds very materially to the comfort and stability of the lower denture and makes one distinction between a denture and a flat lower, or, as it is often called, a floater. I firmly believe that almost any patient could utilize this extension if the operator in taking the impression could locate the exact position where this lingual curve should be correctly placed and a proper tissue-adapted impression were made.

When these compound impressions are made, we make our casts and then cover them with a sheet of wax and strengthen this where necessary. We then place a strip of wax about 3 or 4 mm. wide on each side of where the teeth would be in the denture, and the cases are flasked and vulcanized.

After vulcanization, they are cleaned up and fitted to the mouth, cut down for muscle interference, etc. The upper should extend posteriorly beyond the hard palate about 1 or 2 mm. If it does not fit tightly enough, this can be corrected by adding a hard compound around the periphery, as is done in the corrective compound technic.

We then place black compound where the teeth should be, bringing this down to about the proper length of the upper teeth, and make the surface perfectly flat on the marble or glass slab. The lower is treated likewise, the compound being brought into flat occlusion against the upper, and the profile made about the length we wish the case to be. We get as good a bite as we can at this time, but as it can be changed at any future appointment, it is only necessary to do the best we can. This flat bite gives the patient a chance to get the mandible into a comfortable position, as it is not locked by cusps or other obstructions, and for this reason, in many cases, I prefer a tray to an old denture used as a tray.

We are now ready to use the wax. There are four different waxes and each one has a place that the others cannot fill. A small amount of each is melted over hot water in the heater that comes with the material. We usually paint or trace a coat of the hard wax on the lower base, with a coat of the medium over this, and place it in the mouth. We repeat for the upper base tray and give instructions to the patient to hold them together for a few minutes until the trays are heated to the temperature of the mouth, when he should begin to use more pressure. If the operator has other work to do, he can do it at this time. He can go back to the patient after fifteen minutes or more and remove the trays, the upper first, and see where the tissues have made pressure on the wax. It is here that skill and practice come in when Everett's waxes are used. If the upper has a high palate or large tuberosity at the third molar area, which will prevent the upper tray from sliding forward, it is a much simpler case than when the mouth is fairly flat, with nothing to keep the tray back in its proper position. In the former case, we do not place so much wax in the front of the tray, as this would tend to push the tray forward. Again, if the upper is much larger than the lower, we use the softer waxes in the upper and the harder waxes in the lower. The upper tray usually has twice the area of the lower, and often much more, and it is because of this fact that the upper denture bosses the lower and a great deal of the trouble develops in making dentures. When the impressions become comfortable, we allow the patient to go home and, if he will do so, I would prefer that he wear the impressions home; but if this does not appeal to him or suit his convenience, I pack them in a box and tell him to wear them as much as he can at home and especially at night, but not to eat with them in the mouth. I prefer to see the patient every day or two, if possible. I can then add wax to suit the case and also change the bite whenever I see that necessity. I like to have the patient wear these impressions until all fear of not being able to wear dentures is banished and any other contra notion is removed from the mind, since in making dentures we have to fit the patient's mind as well as the mouth.

The soft waxes are placed along the periphery to allow the muscle trimming that is a feature of each case. The harder waxes do not move easily in such places. The hard and medium are used to assure tightness and resistance. Along the lower extension, I use the softer waxes. When the impressions appear to me to be perfect, I place a coat of the extra soft wax on the upper and either extra soft or the soft on the lower and have the patient wait in the office for an hour or more until the case satisfies me. It is very important in all cases to satisfy ourselves and the patient that we have the correct bite and the proper length of face. When every step has been completed, I use a warm instrument to mark where the two compound surfaces come together, so that, when they are removed from the mouth and the impressions are poured, I can fasten the two cases together exactly as they were in the mouth. I then mount them on an articulator.

One of the chief essentials in getting these impressions is to study the tissues of the mouth, for, with experience, we will see much more in them than we ever thought could be found. They can be read like a book.

Our claims for this procedure so far are these: We have impressions taken under the pressure of mastication; they

are taken of the underlying bone, through the soft tissues until we obtain tissue adaptation. If this is accomplished, we have a tissue-adapted bite taken at the same time and under the same pressure as the impressions, which should be correct in 99 per cent of cases.

After these cases are mounted on an articulator, we separate the impressions from the casts by placing each part in water just deep enough to heat the plaster but not to allow the water to touch the wax. When the wax begins to melt, we remove the impression from the cast and trim the edges of the cast where necessary.

When the late George E. Everett, in 1921, brought to the attention of our profession his corrective tissue-adaptive method of taking impressions, we doubt that he fully realized the benefits he had contributed to edentulous patients. When these impressions are worn for the necessary length of time, their greater comfort is readily appreciated by the patient, especially if he has worn dentures previously. This method allows the complete circulation of the blood supply under the impressions and prevents undue pressure on the nerve supply. These are some of the reasons that dentures made from good wax impressions never cause an unhealthy oral condition. Scraping and correcting either the impression or the cast by guesswork is done only with a desire to improve them, and is an admission that the impression is imperfect.

The casts being mounted, we are now ready to start the proper setting of the teeth. We first place a shellac base over each cast and fit it as best we can. We then place compound on the upper, building it down to where we think the occlusion of the upper teeth should be when a template is added, and which is made to fit. We then build the lower up to this, adding another template, two templates keeping the compound bites apart. These bite-blocks, or bite-rims, are tested in the mouth and are made wider than we expect the occluding teeth to be. When this is found satisfactory, we cut a groove on the occlusal surface of each, and fill these grooves with a mixture of carborundum, plaster and water. When this mixture is hard, we place the lower in the mouth and then the upper, and instruct the patient to slide the mandible forward and backward, then right and left, and repeat. We try to assist the patient, because, at first, when the case is too high, it is not so stable. When some of the "chewing-in" has been done, we remove both cases, wash away the loose material and allow the patient to rinse the mouth. They are then tried on the articulator to assure that the patient does not chew them beyond where the incisal guide pin touches its base. When this point is reached, after one or more trials, the occlusion should be exactly the same on the articulator as it was in the mouth. When we were using the old-fashioned cusp teeth, we used the facebow to mount our cases; but we feel that we do not need this device now, for the teeth are set directly against this ground surface; which we think is better than depending on any falsely so-called "anatomic articulator." I have ground in almost all of my cases for five years, and find that the occlusion, when the case is finished, is almost exactly as it was when the case was set up on the articulator. I never trust the template to set up the teeth for I have never found a ground occlusion that agreed with the template.

For the last two years, I have worn Hall's inverted cusp posterior teeth, and I have neither worn nor used any cusped teeth in my work. From my own experi-

ence, as well as that of my patients and other dentists, I am convinced that this new tooth is absolutely the best posterior tooth that our profession has ever had for artificial dentures.

In setting up the teeth, I set each tooth against the opposed chewed-in surface, and arrange them as I think they should be for esthetics. Whichever set I place first, I arrange the other in occlusion with it. Generally, it is the upper first and I then start the lower with the first molar.

The teeth should in all cases be tried in the mouth to test the esthetics; but I never change the bite that I get in the first mounting, and the occlusion of the teeth should be the same when finished as they were when set up on the articulator.

One point in using the Hall teeth is that the anterior teeth should practically follow the curve as ground because, if the anterior teeth strike too heavily when the mandible is brought forward, they will not be comfortable. There are no cusps on these teeth, as on the old cusp teeth, to lower the mandible when it is brought forward.

Another feature about these teeth is that the lower posterior teeth should not be set directly under the upper, for this will allow the patient to bite the tongue or cheeks. The lower teeth may be set either buccally or lingually, forward or backward, of the usual position, and, when set buccally, it affords us what we have been wanting, cross-bite teeth. Furthermore, this arrangement gives more room for the tongue, which is a decided advantage.

A great deal of complaint has been heard about the change of the fit, and also in the arrangement of the teeth in vulcanization. This should not be, but often does happen if the case is vulcanized in the old type apparatus. I never have any trouble on that score, as I employ a compensating vulcanizer, and there is no pressure on the flask while the heat is rising. When 60 pounds steam pressure is reached, I close the flasks, and this after all the expansion has taken place, and also some of the contraction. It is therefore almost impossible to cause undue pressure that will force any change on the casts or teeth.

During the last few years, a great improvement has been made in using other materials than vulcanite as a base for a denture. Some of these materials have fallen by the wayside while others, improved, are still with us.

My experience has been mostly with one of the condensites and I like it very much. It is easier on the tissues than vulcanite; food does not adhere to it as to vulcanite, and the appearance in the mouth, where it shows, is so much better than that of vulcanite that it is futile to make comparison.

There are two objections to one or more of these substitutes. They either break more easily or do not hold their color. As a rule, they require a sheet of tin foil over the cast, and also over the exposed wax when being cast into the denture base. The latter does no harm, but when even a thin sheet of any material is placed over the cast, it must make the denture larger, unless it is a flat surface. The appearance of the finished denture is so much improved that we can afford to overlook some deficiencies.

SUMMARY

A tissue-adapted impression should be taken, a proper bite procured, and the very best set-up that it is possible to make, with vulcanization that does not change the shape of either the cast or the

position of the teeth. Then the teeth should be correctly polished without warping the base. When placed in the mouth, they should not require grinding in order to take the same position they were in on the articulator. Each and every point is just as important as the other, and a failure of any one means a failure in the end.

I do not believe that inverted cusp teeth should be ground to get the proper occlusion or articulation. If such a change is required, we should rebase or reset the upper or the lower plate. Hundreds of cases that might have been termed dentures have been ruined by grinding, and have finally become just plain "false teeth."

I have been happy and contented since losing the last of my natural teeth, but I seriously regret the fact that I did not have all of my lower teeth removed in March, 1919, when the upper teeth were extracted. In August, 1923, I lost the remaining posterior lower teeth, and I wore a partial plate until March, 1924, when the anterior lower teeth were extracted. Before the hemorrhage had stopped, I placed a full denture in my mouth, and I have never eaten a meal without teeth since that time.

From the time of my graduation, I, in my ignorance, had condemned false teeth, saying they were just substitutes and often very poor substitutes at that. Because of this fact, I tried to get my patients to keep their natural teeth even though of very little account. Since I have been wearing these substitutes, I claim they are worthy of our best efforts.

When a patient comes to our offices with teeth that we well know will not remain in the mouth long, no matter how hard both we and the patient struggle to keep them, we should not frighten the patient regarding false teeth, but encourage him by telling him the best we know about artificial dentures. Let us remember the Golden Rule and treat patients as we would like to be treated were we in their place.

We all know that the majority of the artificial dentures that are made are not comfortable or are not worn, but is this not directly the fault of the profession rather than of the patients in the majority of cases? It is a matter of surprise to me how many dentists have said something like this, "What is the use of my trying so hard to make teeth when, with the most of my cases, the patients tell me they are well satisfied with what I have made for them?" "I am getting by," is a favorite expression. The big question to my mind is, should we be satisfied with "getting by" when we know others are making much better dentures than we are? I am not a specialist in making dentures, but it is my hobby, and I enjoy making them more than I enjoy any other part of dentistry, but when men who specialize have trouble sometimes and admit it, how can the dentist who takes a very poor impression, perhaps a mush bite, and then sends it to a laboratory whose chief recommendation is the low price it receives for its plates (and often they are not even tried in but just receive the common order "medium light to be done tomorrow"), expect any better results than we get? Laboratory men all over this country will tell you that if they were to publish a price list and some other laboratory would cut their charges by even 25 cents on each case, the latter will get the bulk of the work to do. When dentists want to get the impression as quickly as they can and as cheap as possible, is it any wonder that make, with vulcanization that does not change the shape of either the cast or the

dentist who makes them? "It takes too much time" is the only fault I have with your technic. When the day comes that a dentist has to wear false teeth, he does not look for the quick, cheap or handy method; at least, after a trial or two, but he wants something serviceable, comfortable and with many other qualifications that he disregarded when he was making them for the other man.

THE ECONOMIC STATUS OF DENTAL COLLEGE FACULTIES*

By J. A. SALZMANN, D.D.S., Philadelphia, Pa.

INADEQUATE SALARIES: THEIR EFFECT ON FACULTY PERSONNEL, THE PROGRESS OF THE PROFESSION AND PUBLIC DENTAL HEALTH

THE subject of the salaries received by dental college faculties may be studied from three perspectives: that of (1) the teacher, (2) the profession and (3) the public. Any or all of these viewpoints lead to the same conclusion; namely, that the financial remuneration of dental college professors, especially those devoting their whole time to teaching, is so inadequate and bears such inequitable relationship to the earnings of the average successful practitioner on the outside as to demand our immediate ameliorative attention. Is it not possible that this condition, as it exists today, is exerting a debasing effect on the quality of dental faculties, which, in turn acts as a retarding influence on the progress of scientific dentistry itself, and ultimately constitutes a detriment to the advancement of public health?

Under present circumstances, the whole-time dental teacher is forced to give his services to the school at a sacrifice to himself and his dependents. In a great many instances, the latter exert certain influences on the teacher which prompt him to forego this sacrifice and relinquish his faculty connections. Thus, dentistry loses many of its ablest men.

While it is true that faculty salaries must not be made so attractive as to assume primary importance in the eyes of the teacher or to act as an incentive to those of no scientific interests who are merely looking for a sinecure, they must be ample to allow the professor to live at the level demanded by custom and convention for the more intelligent members of society. "Whatever geniuses may put up with in order to work," says Flexner (1925), "universities must in the long run be conducted by human beings who, however able and devoted, will, if pressed too hard, be compelled to seek another sphere of activity in which they can make prudent and proper provision for their families."[1]

GENERAL RECOGNITION OF THE CONDITION

The inadequacy of the salaries of college faculties is receiving recognition from many sources. A resolution adopted

1. Flexner, Abraham: Medical Education —Comparative Study, New York City: The Macmillan Company, 1925.

by the Yale University Chapter of the American Association of University Professors (1928) says, in part, "There is reason to believe that the economic conditions of this profession (teaching) are now such as effectively to discourage many young men of high quality of intellect and force of character from adopting this profession."[2] We can easily agree with Henderson and Davie (1928) when they state: "The relation of wage level to quality of personnel, which holds in other callings, is equally effective for the profession of learning. The university will get the quality that it pays for."[3]

President Angell (1928) of Yale considers the problem presented by insufficient academic salaries the most important confronting American education. He speaks of the "hard and unremitting physical drudgery" of the wives of college faculty members, "themselves college bred women in most instances," and classes their children with the underprivileged. One of the sad ironies of this embarrassing condition is the fact that faculty members in some of our larger universities cannot afford to send their children to the very institutions where they themselves teach. At the same time, Irons (1930) finds that "university education itself has for the past decades been furnished to sons and daughters of the well-to-do at less than cost at the expense of the families of the inadequately paid university professor."[3] In short, as Taylor (1930) so tersely puts it, "The fiat currency of honor and position does not pay the bills."[4]

INCREASED ECONOMIC STRESS AMONG COLLEGE PROFESSORS

Academic salaries always were low, but heretofore the economic stress of the college professor was not so great as it is today. William A. Noyes (1930), of the University of Illinois,[5] shows that while the purchasing power of money in 1925 was only one-half of what it was in 1900, the average person received for his labor three times as much in 1925 as he did at the opening of the twentieth century. Taking into consideration the diminution of the purchasing power of money, the average worker received for his part in production a wage which represented 50 per cent more in purchasing power in 1925 than it did twenty-five years before that date. To express this in a simpler way, we might say that a person who received a salary of $2,000 in 1900, must have received $6,000 in 1925 in order to have been in an equitable relationship with other earners. In the case of college teachers, this equity did not and does not at present hold true. Index numbers[6] obtained of the values of salaries of college teaching staffs in seven of the leading universities, where salaries are presumably higher than in smaller teaching institutions, show no such proportionate increase. The average wage earner receives at the present time 57 per cent more salary, considered in equitable relationship, than the college professor. The assistant professor re-

2. Henderson, Yandell, and Davie, M. R.: Income and Living Costs of University Faculty, New Haven: Yale University Press, 1928.

3. Irons, E. E.: Telescopic Vision and Medical Economics, J. A. M. A., 95:4 (June 7) 1930.

4. Taylor, W. P.: Discussion of Symposium on Salaries Paid College Professors, Science, 71:1842, 1930.

5. Noyes, W. A.: Are Equitable Salaries Paid to Professors? Science, 71:1842, 1930.

6. An index number is a ratio of one value to another value of the same kind which is taken as a base.

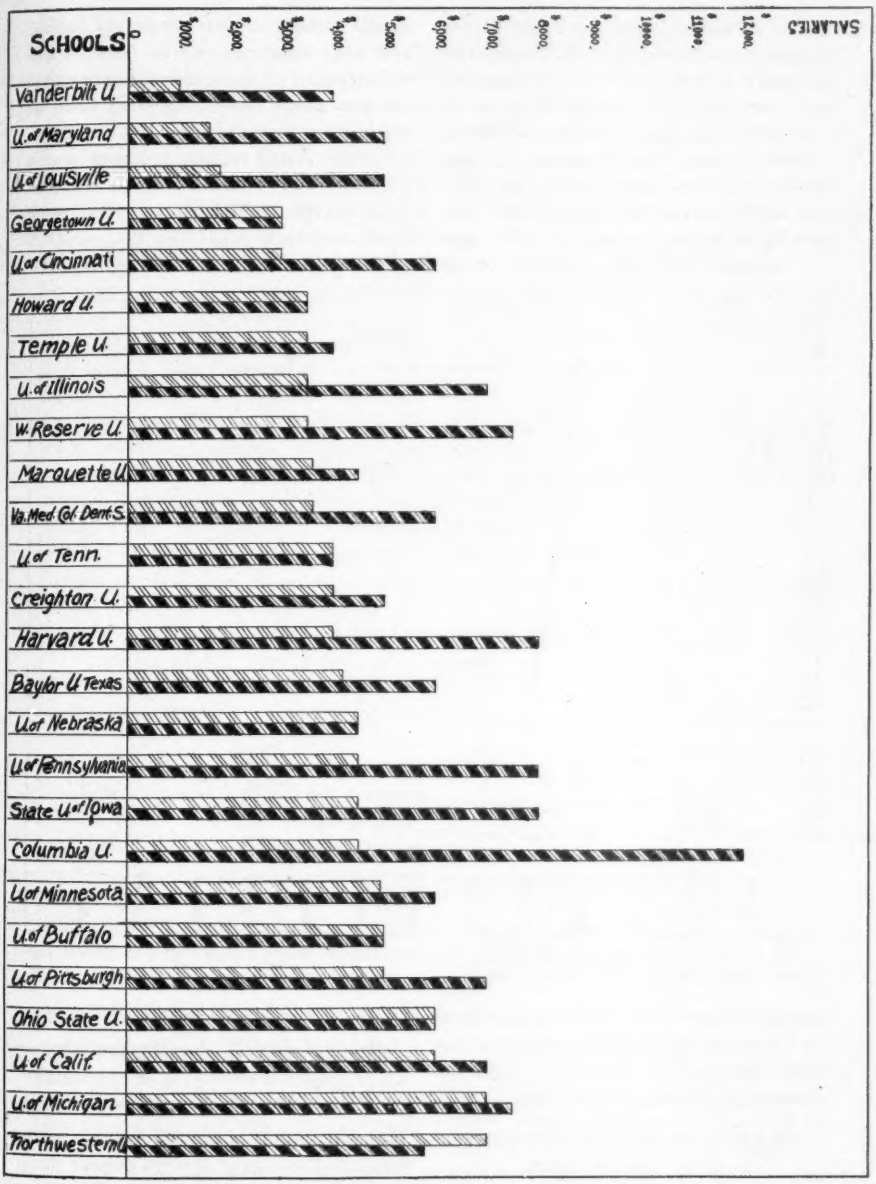

Fig. 1.—Comparison of salaries of medical and dental teachers (light columns, in dental schools; shaded columns, in medical schools).

ceives nowadays 8 per cent less in real wages than he did in 1913; while the professor is even worse off, receiving 15 per cent less in real wages than he did seventeen years ago or before the World War. Flexner (1925) points out that medical salaries have not kept pace with the rise in the cost of commodities.[1] Surprising as it may appear, in real wages the salaries of college professors in the United States are lower than those paid in Germany and France, countries that have not yet fully recovered from the devastating effects of the World War.

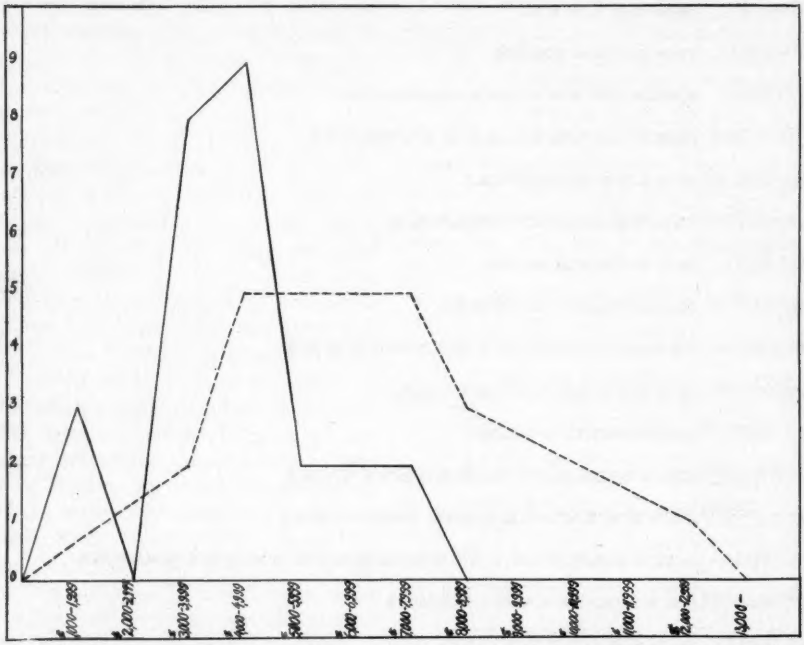

Fig. 2.—Frequency polygons of salaries in medicodental subjects (solid line, in dental faculties; broken line, in medical faculties).

LACK OF DIRECT DATA ON DENTAL FACULTY LIVING COSTS

Although there are no specific data available on the economic condition of dental faculty families, no survey having ever been made, the salaries received and the standard of living are so similar that we may accept findings in other fields of teaching as representative of conditions affecting dental school teaching staffs. Inquiries conducted recently in different parts of the United States reveal some significant facts regarding the standard of living of families of college faculties.

DATA ON UNIVERSITY OF CALIFORNIA

Peixotto (1927) investigated ninety-six professional families at the University of California. This investigator found that three-fourths of the faculty were compelled to engage in work outside their regular duties, in most instances taking no vacations, in order that they might

bring up their incomes to meet the requirements of a middle-class standard of living. "Much energy is deflected from constructive work to go towards forcing a lesser total upward."[7]

The salary scale at the University of California ranks from $1,800 to $2,200 for instructors; $3,000 to $3,900 for associate professors, and $4,000 to $8,000 for professors, but, we are assured, there are very few at the latter figure. As in no rank are the salaries sufficient to pay all of the living expenses of the respective families, supplementary income is necessary. Below 35 years of age, none are professors; they are usually that old when receiving assistant professorships, which pay a maximum salary of $2,700. It takes from fourteen to eighteen years, at which time the teacher is around 50, before a professorship is obtained. About one-quarter receive professorships before 50, but the usual age is 52. Ninety per cent of the salaries are below $5,000, the average being a little over $3,000.

Peixotto found that $5,000 was needed by these families, consisting of 3.5 persons on the average, in order to maintain a standard of living compatible with health and decency. With one automobile for every 4.5 people of the population, we find these families owning one car for every nine persons. It must be remembered, too, that we are dealing with a group of more than one and a half times the average number of adults; there being only 1.5 children per family.

EXPENDITURE ON DENTAL CARE BY UNIVERSITY OF CALIFORNIA FACULTY FAMILIES

At California, 90 per cent of the families of members of the teaching staff, classified as "wise spenders" (a class which may be depended on to choose essentials before spending money on luxuries or nonessentials) reported dental expenditures averaging $50 per family. If we take into consideration the fact that these families are composed of highly intelligent persons who presumably appreciate the importance of dental care, the following observation should give us as dentists plenty of food for thought. Says Peixotto, "From the data, it seems fairly certain that these faculty families economize on preventive dental work because they must. In this, they are probably representative of a large class of spenders in the world at large. All higher costs of dentistry appear in the higher expenditure levels only. From this fact, it seems fair to argue that the lower costs of dentistry in the lower income groups may be due in part at least to inability to pay or to a relative unreadiness to allot surplus to dental prophylaxis."[7]

CONDITION OF YALE FACULTY MEMBERS

Turning to another, more recent investigation, that of Henderson and Davie at Yale, we find conditions quite similar to those existing on the Pacific Coast. In this instance, dealing with one of the richest endowed institutions of learning in the country, we again find the salaries of the teaching staff quite inadequate.

Employment of domestic service is generally considered an indication of a higher living standard. This survey points out that 39 per cent of the married teaching staff at Yale employ no domestic service. Our idealistic conception of the college professor is rather rudely jolted when we read that 21 per cent of the wives of most of them, college bred though they be, do their own laundry, "their husbands aiding perhaps."

7. Peixotto, Jessica B.: Getting and Spending at the Professional Standard of Living, New York City: The Macmillan Company, 1927.

MAXIMUM AND MINIMUM SALARIES OF DENTAL SCHOOL TEACHERS

Largest Salary Paid a Full-Time Teacher of a Dental Subject	Smallest Salary Paid a Full-Time Teacher of a Dental Subject	Largest Salary Paid a Full-Time Teacher of a Medico-dental Subject in a Dental School	Largest Salary Paid a Full-Time Teacher of a Medico-dental Subject in a Medical School	Smallest Salary Paid a Full-Time Teacher of a Medico-dental Subject in a Dental School	Dental Schools
$8129	$1800	$4450		$1800	University of Southern California
6500	1800	6000	$7000	2200	University of California
4000	1500	2250		1250	College of Physicians and Surgeons
3300	1500	3570		1500	University of Denver
2000	2000	3000	3000	1500	Georgetown University
3000	2400	3500	3500	1500	Howard University
3300	2400	2400		1800	Atlanta Southern Dental College
4500	2025	4500		2400	Loyola University, Chicago
7000	1800	7000	5800	2800	Northwestern University
6000	2000	3500	7000	2700	University of Illinois
3000	2000				Indiana University
4500	1500	4500	8000	2000	State University of Iowa
4000	1400	1800	5000	1800	University of Louisville
			6500	1800	Tulane, University of Louisiana
2000	2000	2500		1800	Loyola University of Louisiana
4000	1800	1600	5000	1600	University of Maryland
4000	4000	4000	8000	4000	Harvard University
5000	1500	4000		2250	Tufts College
7000	1800	7000	7500	1800	University of Michigan
4950	2200	4950	6000	1800	University of Minnesota
3600	2400	2400			Kansas City-Western Dental College
4200	1800				Washington University, St. Louis
3900	2400		7500	500	St. Louis University
3600	2400	4500	4500	1800	University of Nebraska
3500	2000	4000	5000	2500	Creighton University
3500	3000	5000	5000	3000	Univeristy of Buffalo
5000	720	9300		3000	New York University
4500	4500	4500	12000	4500	Columbia University
3000	1600	3000	6000	1600	University of Cincinnati
4500	1425	3500	7500	2000	Western Reserve University
5000	2400	6000	6000	2400	Ohio State University
4000	1200	3000		1200	North Pacific College
6000	2500	4500	8000	2400	University of Pennsylvania
3500	1500	3500	4000	3000	Temple University
4500	1800	5000	7000	2400	University of Pittsburgh
4000	2000	4000	4000	1600	University of Tennessee
3500	1200	1000	4000		Vanderbilt University
2400	1000		2500	1500	Meharry Medical College Dental School
4200	3000	4200	6000	3000	Baylor University, Texas
3600	1500	3600	6000	3000	School of Dentistry, Virginia Medical College
3850	1200	3600	4500	2000	Marquette University

Married folks, even at a $4,000 salary, if they have two children, cannot afford to spend money on books or theaters except in the gallery where they may "look down on the students in the orchestra seats, where the teachers cannot afford to sit." Fifty-six per cent of the instructors and as many as 41 per cent of the professors have no surplus savings. The nature of the findings are so repetitious as to make any further exposition of them superfluous; we shall therefore confine ourselves to a brief outline of salary ratings among dental college faculties.

MINIMUM SALARIES IN UNDERGRADUATE INSTITUTIONS ON A LEVEL WITH MAXIMUM SALARIES IN DENTAL COLLEGES

It is generally accepted that salaries in professional schools are as a rule higher than those paid in undergraduate institutions. The figures obtained on dental school salaries do not seem to bear that out. Yale and California, respectively, pay minimum salaries of $6,000 and $4,000 to professors in the undergraduate schools. These, as we shall show, are on a level with the maximum salaries received by the highest paid whole-time professors in our dental schools.

The accompanying table is based on figures compiled by Gies (1926) and published in Bulletin No. 19 of the Carnegie Foundation for the Advancement of Teaching.[8] While this bulletin was published in 1926, we have a letter from Professor Gies dated May 28, 1930, assuring us that, although "there has been some degree of improvement since the publication of the Bulletin on Dental Education," it is "not sufficient to indicate more than a short step in the right direction."

As indicated by the table, in only six of forty dental schools does "the largest salary paid a whole-time teacher of a dental subject" amount to more than $5,000 per year, 60 per cent receiving less than $4,100 per year. Forty per cent of this group, the highest paid teachers of dental subjects, receive less than $3,600 per year, the mean being $4,250 and the median about $3,900 per year. Fifty per cent of those in the smallest salary column, teaching dental subjects, receive less than $1,801 per year, only four receiving over $2,500 per year. The mean is $1,970 and the median is $1,800 per year.

COMPARISON OF ACADEMIC AND MEDICODENTAL SALARIES IN MEDICAL SCHOOLS WITH THOSE IN DENTAL SCHOOLS

Figure 1 illustrates clearly that in nineteen of twenty-six cases the teacher of a medicodental or an academic subject who is a member of a medical school faculty receives a larger salary than the teacher of the same subject who belongs to a dental school faculty. In five instances, the salaries are even, and in the case of Northwestern University, it is higher in the dental school than in the medical school.

PERCENTAGE OF DIFFERENCE BETWEEN ACADEMIC AND MEDICODENTAL SALARIES PAID IN MEDICAL AND IN DENTAL SCHOOLS

Figure 2 indicates that twenty of the twenty-six universities having both medical and dental colleges pay less than $5,000 to teachers of academic and medicodental subjects belonging to the dental school faculty. The figures for those teaching these subjects as members

8. Gies, W. J.: Dental Education in United States and Canada, Bull. No. 19, Carnegie Foundation of the Advancement of Teaching, 1926.

of the medical faculty show almost the exact opposite to be true, nineteen of twenty-six receiving $5,000 or more and only seven less. The highest salary for those on the dental faculty is $7,000, while, for the medical faculty, it is $12,000. The mean salary for those on the dental faculty is $4,100 and the median $4,000. For those belonging to the medical faculty, the mean is $5,867 and the median about $6,000, the mean difference being 42 per cent less in the dental schools than in the medical schools. Whatever the reason for the existing disparity, there is no doubt that the lack of endowments among dental schools is one of the underlying causes of this condition.

COMPARISON IN GROWTH OF DENTAL WITH MEDICAL INCOME FROM ENDOWMENTS

A brief consideration of the respective incomes from endowments of dental and medical schools will help us to understand why there is such a wide difference in amounts of the salaries paid by these institutions. The figures for the dental schools are from data compiled by Gies (1920-1930) in connection with his work in the Carnegie Foundation. Those for the medical schools are from the Biennial Report of the United States Bureau of Education[9] and have been compiled by Colwell (1929), secretary of the Council of Medical Education and Hospitals of the American Medical Association.

In 1920, only four dental schools of forty-six then in existence had any income from endowment, the total amount being $41,520. Of this, Pennsylvania received $25,000; Harvard, $10,420; Columbia, $6,000, and Pittsburgh, $100. By 1924-1925, there were only forty-three dental schools in existence. Of this number, six showed income from endowments: Pennsylvania, $34,952; Harvard, $9,500; Columbia, $6,550; California, $589; Northwestern, $610, and Pittsburgh, $200. Not until 1926-1927, when Northwestern University received the Montgomery Ward bequest, did the aggregate income from endowment for all dental schools reach $100,000. During that period, it was $106,735, with seven out of the forty dental schools in existence receiving all of the income.

In 1929-1930, the total amount of income from endowments for all dental schools amounted to $136,540, Pennsylvania, Northwestern and Harvard sharing $129,765 among them, while five other schools together shared the remaining $6,775. Thirty of thirty-eight dental schools had no income from endowments.

In the case of medicine, conditions appear to be decidedly better. According to Colwell,[9] during 1926-1927, thirty-one of sixty-three medical schools reporting had an income from endowments of $2,784,527, Harvard and Johns Hopkins Universities each receiving over $500,000. Seven of the thirty-one medical schools reporting income from endowments each received more than all the dental schools in the United States combined.

Comparing the number of practitioners in dentistry[10] with those in medicine and considering the relative importance of dental health as a prophylactic factor

9. Colwell, N. P.: Medical Education 1926-1928, Biennial Report of the U. S. Bureau of Education, reprinted from Federation Bull. No. 15, p. 325, 1929.

10. Allon Peebles in his Abstract of Publication No. 3, A Survey of Statistical Data on Medical Facilities in the United States, published by the Committee on the Costs of Medical Care, Washington, D. C., 1929, gives the number of physicians as 143,000 and that of dentists as 67,334.

in systemic diseases, we may say that the respective incomes from endowments in dentistry and medicine, from $136,540 to almost $3,000,000, are not equitably proportioned. As an example of what can be done in the way of raising endowments, we might point out that Johns Hopkins, Yale, Harvard, McGill and Washington universities and the University of Toronto, which, having a combined endowment of approximately $4,000,000 in 1910, raised it to $27,490,873 in 1920.[11]

UNFAIR RELATIONSHIP BETWEEN SALARIES OF DENTAL SCHOOL PROFESSORS AND THE EARNINGS OF DENTAL PRACTITIONERS

Finally, we might point to the fact that whatever the attractions of a dental teaching career may be, it is quite evident that the economic independence of the teacher is not one of them. Furthermore, we find absolutely no equitable relationship between the salary of the dental college professor who devotes his whole time to teaching and the earnings of even the average successful practicing dentist.

RELATION OF DENTAL FACULTY SALARIES TO PRODUCTIVE SCHOLARSHIP

"The economy of high wages" as well as "the wage of efficiency" described by Hobson,[12] economic factors considered important in increasing the quality and quantity of production, are here grossly neglected, in spite of the fact that economists recognize a direct relationship between salaries received and efficient performance of work. Elsewhere,[13] we spoke of the bent for intellectual curiosity, which is of such importance to the research worker and teacher, as being best developed after the elemental economic needs are provided for. It is rather unfortunate for dentistry that these truths are not as yet recognized by the dental profession. The present state of affairs tends to minimize productive scholarship.

It is both unfair and illogical for dentistry to expect its teachers and research men to perform their work efficiently under an economic handicap. The dental profession will continue to be criticized for its impotency in research accomplishments and for the lack of proficiency in its teaching forces just so long as it expects a small group of men—less than 400 in all—to devote all of their time in the capacities of executives and teachers, while constantly laboring under the onus of economic insecurity. Nor is the part-time teacher to be blamed for his lack of interest in dental research when he is not adequately provided for in an economic way. History shows repeated examples where economic stress conditions ethical behavior.

DUTIES OF THE PROFESSION TO THE DENTAL FACULTIES

It is hard to believe that our great philanthropists are more interested in the size of the clinical institutions than they are in the quality and quantity of dental progress itself. If increased endowments are necessary in order to obviate both the employment of deans for part-time only, as is the case in half the dental schools, and the payment of insufficient salaries to whole-time dental college pro-

11. General Education Board, Occasional Papers No. 7.

12. Hobson, J. A., author of "Work and Wealth," etc., defines "the efficiency wage" as "that wage which an intelligent employer will in his own interest pay."

13. Salzmann, J. A.: Basic Outline for Study of Economics as Applied to Dentistry, Dent. Cosmos, 72:5 (Jan.) 1930.

fessors, it is the duty of organized dentistry to work toward that goal. The full-time faculty member must be paid a salary which is at least equal to the earnings of the average successful dental practitioner. Dental scientists and men in the higher teaching ranks should not be forced to seek supplementary income from work not directly related to their usual duties.

Glenn Frank (1923) is of the opinion that any betterment in the condition of the teacher can result only from the efforts of the teaching profession itself acting as an organized force. Under the title "Should Teachers Unionize?" he says, "Educational policy and the major part of educational administration must ultimately rest in the hands of teachers if our educational system is to give a square deal to its servants and render effective ministry to the mind of the nation."[14]

Today, whether or not he chooses to do so, the college professor is being made to feel by dint of his economic stress that he must take cognizance of the economic changes that have taken place in his environment. He can no more continue to be bound by his vitiated economic traditions than he can allow himself to be guided by the archaic laws of alchemy.

34 South Sixteenth Street.

14. Frank, Glenn: An American Looks at His World, Newark: University of Delaware Press, 1923.

FOCAL INFECTION OF THE TEETH AND ELECTIVE LOCALIZATION IN THE EXPERIMENTAL PRODUCTION OF ULCERATIVE COLITIS*

By THOMAS J. COOK, D.D.S., Philadelphia, Pa.

THIS study deals with the induction of ulcerative colitis following the production of chronic foci in the alveolar processes of dogs. The foci were produced by devitalization of the teeth and infection of them with streptococci isolated from infected teeth of patients who had chronic ulcerative colitis.

METHOD OF STUDY

The methods employed in general resembled those used by Rosenow and his associates, in a long-continued study of focal infection and elective localization, and were precisely like those used by Rosenow and Meisser[1] in the production of nephrolithiasis, by Meisser[2] in the production of ulcer of the stomach,

*From the Division of Experimental Bacteriology, the Mayo Foundation, Rochester, Minn.

1. Rosenow, E. C., and Meisser, J. G.: Elective Localization of Bacteria Following Various Methods of Inoculation, and Production of Nephritis by Devitalization and Infection of Teeth in Dogs, J. Lab. and Clin. Med., 7:707-722 (Sept.) 1922; Production of Urinary Calculi by Devitalization and Infection of Teeth in Dogs with Streptococci from Cases of Nephrolithiasis, Arch. Int. Med., 31: 807-829 (June) 1923.

2. Rosenow, E. C.: Experimental Observations on Etiology of Chorea, Am. J. Dis. Child, 26: 223-241 (Sept.) 1923.

and by Rosenow in the production of chorea[3] and hiccup.[4]

Accordingly, teeth of patients were extracted under sterile conditions, and while still held in the extraction forceps, the apices were severed with special cutting forceps, and were dropped into tubes with screw tops, each of which contained about 1 c.c. of gelatin-Locke solution, as recommended by Rosenow, and sand, as recommended by Haden. Each screw-topped tube, containing the apex of a tooth, was sealed immediately, taken to the bacteriologic laboratory and placed on a shaking machine for ten minutes in order to macerate the tissue about the apex of the severed end of the root as much as possible. This shaken material from each tooth was then transferred, by means of pipets, to two tubes of glucose-brain broth and one tube of glucose-brain-agar, as well as being streaked on a blood-agar plate. The apex was placed in one of the tubes of glucose-brain broth.

If a granuloma was present, it was removed, and all, or part of it, was placed in 10 per cent solution of formaldehyd (formalin) and sent to the laboratory for section.

After eighteen hours' incubation, the cultures in glucose-brain broth were examined microscopically, the number of colonies in the tubes of agar were recorded and the blood-agar plates were read.

Four healthy rabbits weighing from 1,500 to 2,000 gm. each were in each case given intravenous injections of the primary cultures in glucose-brain broth.

TABLE 1.—LESIONS IN RABBITS FOLLOWING INTRAVENOUS INJECTION OF STREPTOCOCCI FROM INFECTED TEETH OF PATIENTS WHO HAD ULCERATIVE COLITIS AND FROM EXPERIMENTALLY INFECTED TEETH OF DOGS.

Source of Cultures	Animals That Received Injections	Deaths	Mortality Rate, Per Cent	Percentage of Animals in Which Lesions of Various Organs* Were Found						Percentage Incidence of Isolation of Streptococcus from Various Organs					
				Colon	Stomach, Duodenum or Both	Kidney	Gallbladder	Joints	Muscles	Blood	Kidney	Liver	Gallbladder	Spleen	Mesenteric Lymph Nodes
Teeth of patient.....	60	21	35	60	6	3	0	5	8	47	10	3	3	5	13
Teeth of dogs three months after experiment was begun...	60	19	32	45	5	2	2	6	10	35	8	6	2	3	10
Teeth of dogs at conclusion of experiment.....	60	18	30	40	6	3	0	6	6	28	10	3	5	5	6

*No lesions were found in organs nor listed in this table and in Tables 2 and 3.

3. Meisser, J. G.: Further Studies on Elective Localization of Bacteria from Infected Teeth, J. A. D. A., 12: 554-565 (May) 1925.

4. Rosenow, E. C.: Production of Spasms of Diaphragm in Animals with Streptococcus from Epidemic Hiccup, J. Infect. Dis., 32: 41-71 (Jan.) 1923.

A dose of 5 c.c. was given at each injection. Each animal, with the exception of those that died after the first injection, received on the third day a second injection of the second subculture made from the original culture that had been made in glucose-brain broth. Animals that died during the night were examined the following morning. The remaining animals were killed with chloroform on the third or fourth day after the second injection, and a complete examination for mascroscopic lesions was made in a strong light. Cultures were usually taken of the heart's blood, kidneys, liver, gallbladder, joints, eyes and mesenteric lymph nodes.

When, at necropsy, lesions of the colon were revealed in the rabbits that had been given injections of cultures of diplostreptococci obtained from foci of patients who had ulcerative colitis, and the heart's blood, colon or mesenteric lymph nodes yielded cultures of diplostreptococci, further studies were carried out on dogs with the cultures thus isolated. If lesions developed in the colon of a rabbit after intravenous injection, and the cultures taken from the various organs of the rabbit were negative, the original cultures were used for injection of dogs.

Ten cubic centimeters of culture in glucose-brain broth, whether the original culture or that obtained from the rabbits that had lesions in the colon, were pipetted into two graduated centrifuge tubes and centrifugalized at high speed for thirty minutes. Most of the supernatant cleared broth was decanted, and the sedimented organisms were then col-

TABLE 2.—LESIONS IN RABBITS FOLLOWING INTRAVENOUS INJECTION OF STREPTOCOCCI FROM INFECTED TEETH OF PATIENTS WHO HAD VARIOUS DISEASES*

Disease from Which Patients Were Suffering When Streptococci Were Isolated from Teeth*	Animals That Received Injections	Deaths	Mortality, Per Cent	Percentage of Animals in Which Lesions of Various Organs Were Found						Percentage Incidence of Isolation of Streptococci from Various Organs					
				Eyes	Stomach, Duodenum or Both	Joints	Heart	Gallbladder	Muscles	Eyes	Blood	Joints	Gallbladder	Kidney	Liver
Iritis	12	3	25	58	8			8		50	58		8	17	8
Ulcer of stomach or duodenum	12	5	42		42			8			50		8	8	17
Arthritis	12	2	17			33	8		17		25	42	17		
Endocarditis	8	4	50				25		12		37			12	12
Cholecystitis	8	3	38					25			25		25	12	12
Myositis	8	2	25		12	25			37		37	25	12	12	

*These cultures were used for inoculating the pulp canals of the dogs that were studied in the control series.

lected by pipets from the bottoms of these tubes, and this concentrated suspension was used for inoculation of the pulp canals of the teeth of the dogs. Only a small fraction of the organisms were actually sealed in the pulp chambers.

After the animal had gone without food for twelve hours, it was placed under ether anesthesia by the auto-inhalation method, as described by Hardenbergh and Mann,[5] on its back and with the head in firm position. The maxilla was parallel with the table and the mandible was drawn back with an apparatus which keeps the mouth wide open, allowing the operator ample working space. A rubber dam was applied, allowing only the tracheal tube and the teeth that were to be worked on to be visible. As a rule, these were the four cuspids. The head and shoulders of the dog were covered with sterile towels. The rubber dam and the exposed teeth were then successively painted with iodin, washed with 75 per cent alcohol and dried. The crowns of the exposed teeth were severed with bone-cutting forceps. This was best accomplished by selecting a median position between the gingival margin and the tip of the crown. A groove was first made with the cutting forceps, most of the enamel being taken off at the point where the crown was to be severed. Then, by applying considerable

TABLE 3.—LESIONS IN RABBITS FOLLOWING INTRAVENOUS INJECTION OF STREPTOCOCCI FROM TEETH OF DOGS INFECTED, AS CONTROLS, WITH STREPTOCOCCI FROM THE TEETH OF PATIENTS HAVING VARIOUS DISEASES

Diseases from Which Patients Were Suffering When Streptococci Were Isolated Originally from Teeth*	Animals That Received Injections	Deaths	Mortality, Per Cent	Percentage of Animals in Which Lesions of Various Organs Were Found						Percentage Incidence of Isolation of Streptococci from Various Organs					
				Eyes	Stomach, Duodenum or Both	Joints	Heart	Gallbladder	Muscles	Eyes	Blood	Joints	Gallbladder	Kidneys	Liver
Iritis	12	2	17	42	8			8		42	50		8	8	
Ulcer of stomach or duodenum	12	3	25		33				8		42		8	8	17
Arthritis	12	2	17			25			8		25	25			
Endocarditis	8	3	25				12				37		12	12	12
Cholecystitis	8	3	25					25			25		25	12	
Myositis	8	1	12			12			25		37	25	12	12	12

*These cultures were obtained from the teeth of the dogs immediately after death from ether.

5. Hardenbergh, J. G., and Mann, F. C.: Auto-Inhalation Method of Anesthesia in Canine Surgery, J. Am. Vet. Med. Assn., 71:493-501 (July) 1927.

pressure, a clean-cut fracture of the crown could be accomplished.

A large round bur was used to open into the pulp canal. The pulp was removed with a sterile broach and the canal dried with sterile cotton applicators. After the hemorrhage had stopped, the pulp canal was inoculated, by means of pipets, with the centrifugalized sediment of bacteria that had been proved to have specific affinity for the colons of rabbits. The canal was then sealed with gutta-percha and amalgam.

Fig. 1.—Upper left first bicuspid tooth of patient who had chronic ulcerative colitis from which pure culture of diplococci was obtained and granuloma removed.

The dog was provided with the same diet as that of normal dogs, and of control dogs the teeth of which were infected with streptococci from teeth of patients having diseases other than colitis. At the end of three months, the filling was removed under sterile conditions. A sterile pipet was then inserted in the canal, and any fluid present was withdrawn and deposited in tubes of glucose-brain broth and glucose-brain-agar. A broach was also used to collect any material that may have been at the apex within the canal, and cultures were made from this also. The opening was then sealed. If the canal was dry, the tooth was removed and cultures were made from the apex in the same way as from the apices of the teeth of patients.

Roentgenograms were made of both jaws while the dog was under ether. This was best accomplished by putting the dog on his back with the plate between the jaws for pictures of the lower jaw. For pictures of the upper jaw, the dog was placed on his belly. This roentgenographic study was made to determine the amount of destruction of bone that was present at the end of three months. The bacteriologic study was to determine whether or not the streptococci that were placed in the pulp canals three months previously were still visable and specific in their localizing power.

After eighteen hours' incubation, the brain broth cultures were studied microscopically, and the number of colonies in the tubes of agar were recorded. Four medium sized to full sized rabbits were given intravenous injections of the primary cultures in glucose-brain broth and were studied and examined in the same manner as the series of rabbits that had been given injections with similar cultures from the teeth of patients.

From this time, until completion of the study, the dogs were kept under observation. Records were made of their weight at different periods, and temperatures were taken and recorded when symptoms developed. The dogs were killed with ether at intervals varying from seven to twenty months. At necropsy, the animal was examined thoroughly for macroscopic lesions and the results were recorded. Sections were taken from lesions in the colon, and from other organs, for microscopic study. The jaws were removed and cultures

were made from the material within the pulp canals after the outside had been sterilized and the filling material removed. Roentgenograms were again made of the jaws. After cultures had been made, the infected tooth was removed, and if a granuloma was present, it also was removed and was put into a 10 per cent solution of formaldehyd for microscopic study.

Cultures obtained from the root canals were incubated for eighteen hours, and another series of four rabbits were given intravenous injection to determine to what degree the organism present had retained its power of elective localization. As a routine, cultures were made from the blood, from pipettings from the kidneys, liver, spleen and mesenteric lymph nodes and from the contents of the gallbladder. (Table 1.)

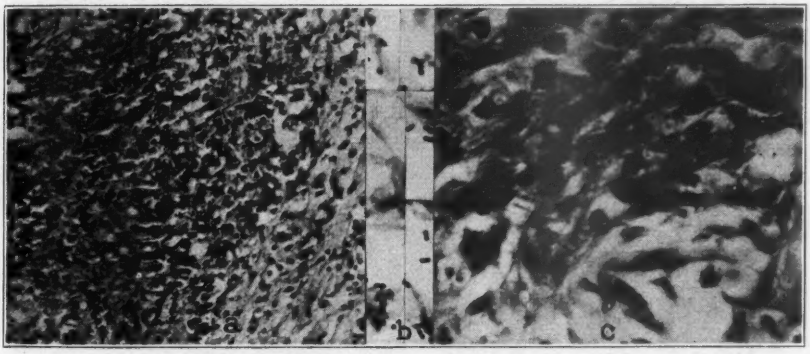

Fig. 2.—Granuloma represented in Figure 1. *a,* cellular infiltration of varying intensity, indicating the presence of embryonal and sclerotic connective tissue (hematoxylin and eosin; ×60). *b,* diplococci within the granuloma (Gram-Weigert stain; ×1,000). *c,* higher magnification of *a,* showing round-cell infiltration (hematoxylin and eosin; ×320).

MATERIAL

Fifteen cases of chronic ulcerative colitis were studied. In order best to illustrate the results obtained, I shall give in detail the experiments in one of these cases, and a summary of the entire series.

A woman, aged 45 came to the Mayo Clinic with a history of having from twenty to thirty bloody stools a day. Since the onset of this condition five months before, there had been daily increase in the number of stools, and the patient had lost 20 pounds. The tonsils had been removed two years previously. Roentgenograms revealed a pulpless upper right bicuspid tooth with considerable destruction of bone about the apex. (Fig. 1.) This tooth did not cause symptoms, and the patient was not aware of the existing focus. Her physician had not considered the teeth as a possible source of infection. Proctoscopic examination revealed ulcerative colitis, and, in a culture taken from the colon, the diplostreptococcus of chronic ulcerative colitis was obtained as the predominating organism.

November 8, 1926, the pulpless tooth was removed. Attached to the apex, there was a mass of granulation tissue about 1 mm. in diameter. This tissue was removed with sterile forceps and was put into a 10 per cent solution of formaldehyd and sent to the laboratory for section. The apex of the tooth was taken immediately to the bacteriologic laboratory and cultures were made.

Microscopic study of the dental granuloma revealed a mass of granulation tissue in a

fibrous capsule. Within this capsule were lymphocytes, plasma cells, polymorphonuclear leukocytes, fibroblasts and newly formed capillaries. The last were prominent, forming a network through the fibrous capsule and penetrating into the surrounding alveolar process. Gram-positive diplococci were demonstrable throughout this granulation tissue. (Fig. 2.)

The tubes of glucose-brain broth, at the end of eighteen hours' incubation, contained an abundant growth of gram-positive, lancet-shaped diplococci. The glucose-brain agar had countless numbers of colonies of diplostreptococci.

November 9, four rabbits were given intravenous injections of the culture in glucose-brain broth. Marked hemorrhagic lesions of the colon, in which the streptococcus injected was found (Fig. 3 *a, b, c*), developed in three. The fourth rabbit died overnight from *Bacillus bronchisepticus* infection, without lesions of the colon.

Cultures in glucose-brain broth obtained from the blood of two of the rabbits in which marked lesions of the colon developed were centrifugalized and were used to inoculate the teeth of a dog.

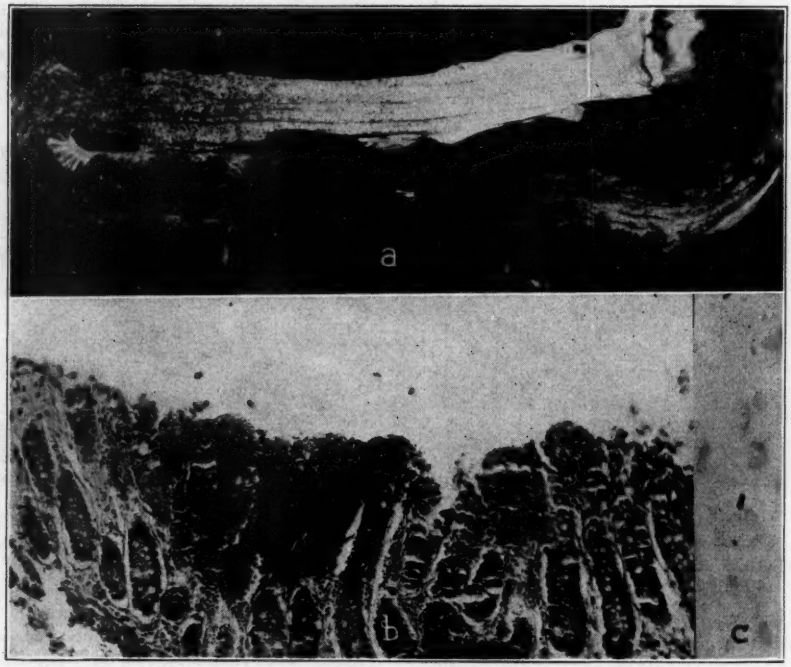

Fig. 3.—*a*, colon of rabbit that had been given intravenous injection seventy-two hours previously, with primary culture of diplococci isolated from tooth represented in Figure 1. There is extreme hemorrhagic infiltration in the lower portion of the colon (×1½). *b*, photomicrograph of section of colon shown in *a*. There is a large wedge-shaped hemorrhagic area with beginning ulceration (hematoxylin and eosin; ×60). *c*, diplococci in necrosing tissue represented in *b* (Gram-Weigert stain; ×1000).

Accordingly, November 14, 1926, a dog, weight 9 kg. (19 pounds 13 ounces), was placed under ether anesthesia and the root canals of the four cuspid teeth were inoculated with this centrifugalized material. The canals were sealed with guttapercha and then

with amalgam. The dog was returned to his kennel and was kept under observation.

February 16, 1927, three months later, the animal weighed 9.5 kg. The temperature was normal. The dog was again placed under ether anesthesia. The four inoculated teeth were reopened, cultures were made from material from the root canals and the canals were again sealed. Roentgenograms made of both jaws revealed a slight degree of rarefaction about the apices of the two lower cuspids.

The eighteen-hour cultures in glucose-brain broth, from the infected teeth, yielded pure cultures of diplococci.

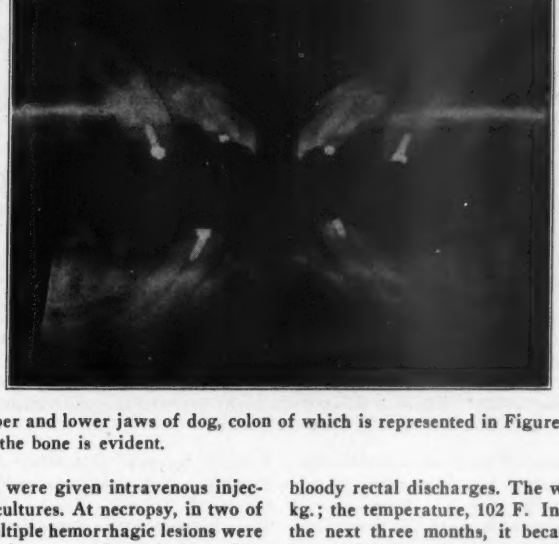

Fig. 4.—Upper and lower jaws of dog, colon of which is represented in Figure 6. Periapical rarefaction of the bone is evident.

Four rabbits were given intravenous injections of these cultures. At necropsy, in two of the rabbits, multiple hemorrhagic lesions were found in the lower portion of the colon. Blood and mesenteric lymph nodes of these yielded diplostreptococci. This was not true of the two in which lesions of the colon were not found.

July 11, eight months after the experiment was begun, the dog first began to pass blood. The animal appeared disturbed and sick, and was having five or six stools a day, with a slight amount of blood.

July 20, the number of stools had been increasing almost daily for the last ten days, until there were between ten and twenty a day, which contained a mixture of blood and pus. The animal refused food. The weight was 8.5 kg. and the temperature was 103 F.

July 30, the condition remained about the same. There were still between ten and twenty bloody, mucopurulent rectal discharges a day. The weight was 8 kg.; the temperature, 104 F. Proctoscopic examination revealed a granular, easily bleeding, diffusely edematous and hyperemic mucous membrane. Cultures were taken through the proctoscope and yielded an abundance of gram-positive, lancet-shaped diplococci.

August 20, the animal continued to have bloody rectal discharges. The weight was 7.5 kg.; the temperature, 102 F. In the course of the next three months, it became gradually better. It grew stronger, and the number of stools were reduced.

December 20, the animal appeared well, but was still having three or four stools a day with slight traces of blood. Its weight was 8 kg., and the temperature was normal.

February 10, 1928, the animal appeared well and the stools were normal, with no trace of blood. The appetite was good; weight, 8.5 kg.; temperature, normal.

February 11, the animal was given a warm bath and then was placed outside for about

two hours in an attempt to lower its resistance.

February 13, bronchitis developed.

February 15, during the night, there was a sudden onset of bloody stools. The following morning, there was evidence of diarrhea. The temperature was 103 F. and the animal weighed 8.5 kg.

February 20, the animal had for five days had a severe mucopurulent rectal discharge, which seemed to be almost continuous. The temperature was 104 F.; the weight, 7.5 kg.

March 6, the discharge of blood and pus continued. The weight was 7 kg., and the animal appeared sick. Food was refused. The temperature was 104 F. The animal was killed with ether.

Four rabbits were given injections of these cultures to determine whether the organisms placed within the root canals months previously were still specific in localizing power. In two of these rabbits, unusual hemorrhagic lesions of the colon developed and cultures from the mesenteric lymph nodes yielded the streptococcus. Two animals were free from lesions and cultures proved negative.

Necropsy on the dog revealed bleeding ulcers of almost the entire lower portion of the colon, extending to the rectum. (Fig. 6.) Cultures made of the bloody exudate in the colon revealed an abundant growth of the large, lancet-shaped, gram-positive diplococci, often in short chains. Sections made of the colon revealed hemorrhages, leukocytic infiltration, necrosis, ulceration (Fig. 7) and diplococci in the margins and depths of the ulcerating tissues. (Fig. 8.) There were no gross lesions of the other viscera.

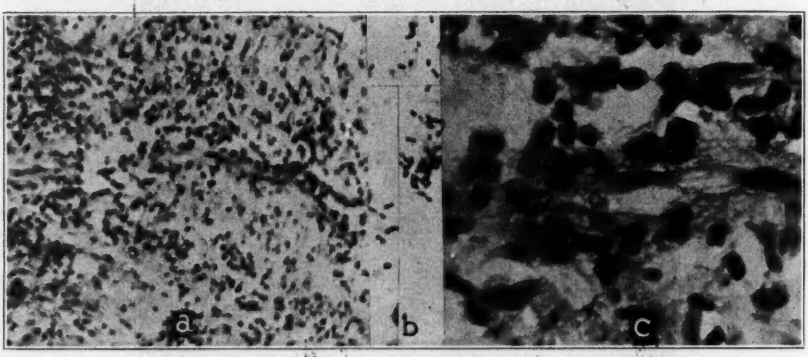

Fig. 5.—Dental granuloma that was removed from jaws represented in Figure 4. *a*, marked cellular infiltration (hematoxylin and eosin; ×60). *b*, diplococci within granuloma (Gram-Weigert stain; ×1000). *c*, higher magnification of *a*, showing round-cell infiltration (hematoxylin and eosin; ×320). There is striking similarity between this experimentally produced granuloma and that (Fig. 2) removed from the patient.

Roentgenograms of the jaws revealed considerable rarefaction about the apices of the lower cuspid teeth. (Fig. 4.) After cultures had been made from the teeth, the jaws were opened lengthwise and granulomas were removed from about the apices of the lower teeth. Sections revealed infiltration by lymphcytes, plasma cells, polymorphonuclear leukocytes, fibroblasts and newly formed capillaries identical to those found in the granulomas of the patient. Diplococci were also demonstrable in these granulomas (Fig. 5 *a*, *b*, *c*). The eighteen-hour cultures from the root canals of the infected teeth and granulomas is glucose-brain broth yielded diplostreptococci.

SUMMARY OF RESULTS

Cultures of diplostreptococci were obtained from infected pulpless teeth of fifteen patients who had suffered from typical symptoms of chronic ulcerative colitis for variable lengths of time. In all cases, active symptoms and ulcerations in the colon were present at the time of study. Of the sixty rabbits that

were given injections (Table 1), 60 per cent developed lesions in the lower portion of the colon, usually in the nature of diffuse hemorrhagic infiltrations. The percentage of rabbits that had lesions elsewhere was small. In 8 per cent, there were lesions in muscles, and this was the highest percentage encountered of rabbits that had lesions elsewhere than in the colon. The diplostreptococcus was recovered from the blood of 47 per cent of the animals at necropsy, and in a smaller percentage in the other tissues cultured.

Seven of the fifteen dogs (47 per cent) lococcus which Bargen[7] described was isolated from the ulcers of the colon or mesenteric lymph nodes of all seven dogs. The animals at first had diarrhea without gross evidence of bloody pus in the stools and little if any ulceration of the colon; whereas, later, they had mucopurulent bloody discharges in great numbers, associated with rise in temperature, loss of appetite, loss of weight and strength and the development of numerous typical ulcers of the colon. The time in months that was required to produce the disease was, respectively, eight, nine,

Fig. 6.—Part of colon of dog in which ulcerative colitis developed sixteen months after devitalization and inoculation of teeth with culture of diplococci obtained from tooth represented in Figure 1, and which localized electively in colon of rabbit represented in Figure 3 (×1½).

the teeth of which were inoculated with cultures derived from the teeth of fifteen patients who had chronic ulcerative colitis developed typical symptoms and lesions of ulcerative colitis. Both the early and the late stages of the disease as described by Buie[6] were revealed by symptoms and proctoscopic examination. The gram-positive, lancet-shaped dip-

eleven (two dogs), thirteen, fifteen and sixteen.

Sixty rabbits were given injections of the streptococcus isolated from the teeth of the dogs infected three months previously. (Table 1.) In 45 per cent of these, lesions of the colon developed.

6. Buie, L. A.: Chronic Ulcerative Colitis, J. A. M. A., 87:1271-1274 (Oct. 16) 1926.

7. Bargen, J. A.: Etiology and Treatment of Chronic Ulcerative Colitis, Am. J. Roentgenol. & Rad. Therap., 16:10-16 (July) 1926; Medical Management of Chronic Ulcerative Colitis, Statistical Study of 200 Cases, Tr. Am. Gastro-Enterol. Assn. 30:145-159, 1928.

Sixty rabbits received injections of similar cultures from the teeth of the dogs at the conclusion of the experiment. Of these, gross lesions of the colon developed in 40 per cent. (Table 1.) The incidence of lesions in other organs in both series was small as was that following injection of similar cultures from the teeth of patients. The specificity, although still in evidence, and coincidentally the mortality rate, became somewhat less as the streptococci continued to reside in the teeth of the dog. (Table 1.)

CONTROLS

In order to obtain a series of controls for this study, cultures were taken from pulpless teeth of fifteen patients who were suffering with various diseases other than ulcerative colitis and four rabbits were given injections in each case, as in the study of chronic ulcerative colitis. Three of the patients had iritis; three, ulcer of the stomach; three, arthritis; two, cholecystitis; two, endocarditis, and two, myositis. The results are summarized in Table 2. Marked elective localizing power of the streptococcus isolated in each of these lesions is shown. In one of the sixty rabbits that were given injections, lesions of the colon developed.

The cultures that had proved to possess elective localizing power were used to inoculate the teeth of fifteen dogs as in the study of colitis. These dogs were kept under the conditions described previously and were watched carefully for symptoms. They were killed one at a time, usually after the death of one of the dogs in the group that had been inoculated with material derived from patients who had colitis. All of these control dogs remained free from symptoms, all increased in weight and, at necropsy, the colon and other organs of all fifteen were found to be normal.

In order to further verify these results, and to determine perhaps why the control animals remained free of symptoms that were characteristic of patients from whom were obtained the different strains of organisms inoculated into the teeth of the animals, cultures were made of material obtained from the infected teeth after death from ether, and these cultures were injected into rabbits in the usual manner and dosage. The results are summarized in Table 3. It was found in this series that although some of the strains of streptococci still had elective localizing power, this was not so marked as when the organisms were placed in the teeth of the dogs and, coincidentally, the general virulence had also become less, as indicated by the lower mortality rate.

Fig. 7.—Sections of margin of one of ulcers shown in Figure 6. There is sloughing, superficial necrosis, edema and nonstaining of nuclei of epithelial cells, and slight cellular infiltration (hematoxylin and eosin; ×120).

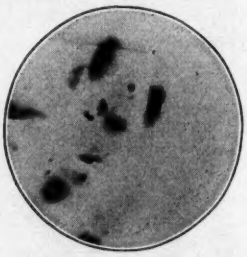

Fig. 8.—Diplococci in ulcer represented in Figure 7 (modified Gram stain; ×1,000).

COMMENT AND SUMMARY

Streptococci that were freshly isolated from pulpless, infected teeth of patients who had ulcerative colitis, and, as controls, from pulpless teeth of patients with iritis, ulcer of the stomach, arthritis, endocarditis, cholecystitis and myositis, localized electively, producing lesions in the colon, eyes, stomach or duodenum, joints, heart, gallbladder and muscles, respectively, of a high percentage of rabbits that were given intravenous injection. Strains which were proved to cause lesions not only remained viable, but also often retained their elective localizing power for months in the teeth of dogs from which the pulp had been removed. They incited the development of regions of rarefaction and formation of granulation tissue in dogs which were, in every essential respect, including the presence of the respective organisms, like those formed about the apices of pulpless teeth of human beings.

The diplostreptococcus derived from patients with ulcerative colitis does far more than that: after from two to sixteen months, it breaks down the inherent resistance of the host, and localizes electively in the colon from the chronic foci around the experimentally infected teeth and produces a clinical and histopathologic picture of ulcerative colitis resembling, in every essential respect, the disease as it occurs spontaneously in man. Lowering of resistance, by such means as exposure to cold, has been shown to aggravate the condition materially.

The causal relationship of the diplostreptococcus to the lesions in the colon is indicated by its consistent presence in large numbers in the focus, by its specific localizing power on intravenous injection of rabbits, and after inoculation of teeth of dogs and by its presence in the lesions of the colon. Dogs used as controls, and kept under the same conditions, and the teeth of which were infected similarly, but with streptococci from infected teeth of patients suffering from diseases other than ulcerative colitis, never developed lesions of the colon.

Now that ulcerative colitis has been reproduced by methods which, in every essential respect, stimulate the conditions at hand in patients, the skepticism which still exists as to the significance of the focus and the inherent specific or elective localizing power of the diplostreptococcus in the etiology of this disease should not long survive.

The results reported herewith emphasize again the importance of focal infection and elective localization as factors in the causation of disease. They add one more disease, ulcerative colitis, to a growing list: nephritis, nephrolithiasis, ulcer of the stomach, chorea and hiccup, all diseases which have been produced through experimentally induced chronic foci by infection of the teeth of dogs with the respective freshly isolated streptococcus or staphylococcus.

It is not entirely clear why the control strains which had been proved to have elective localizing power in rabbits failed to produce disease in the dogs. The number of experiments with the different strains may have been too small; the invasive power of the streptococcus may not have been great enough, or perhaps the duration of the experiment was not long enough to produce gross evidence of disease in the respective structures.

The prevention or elimination of dental foci of infection in patients who have chronic ulcerative colitis, as in other diseases in which a focus has been shown to harbor the causative organism, should prove of great importance as a preventive and curative measure.

THE PEDIATRICIAN AND DENTISTRY*

By ROYAL STORRS HAYNES, M.D., New York City

ALTHOUGH I can bring you nothing that your great teachers have not already told you and with infinitely more authority, yet because I approach from a somewhat different point of view the subject of dentistry as a health service, the expression of my enthusiasm for the work you are doing and my realization of the great opportunity which is yours in the realm of the public health may have some value; and this word of appreciation from a fellow practitioner in the art of healing may encourage you to persevere in your endeavors.

As a pediatrician, whose interest is largely in the problems of childhood, I encounter at every hand questions relating to growth. That a child may grow properly, he must have proper nutrition; his digestive tract must function properly, as well as receive the proper food elements. Part of the function of the digestive tract is mastication. Mastication implies the use of jaws and teeth; and so, immediately, it becomes important to me, as a pediatrician, that the children under my care have normal dentition so that they may have normal digestion, normal nutrition and normal growth.

My work, therefore, demands that I have some knowledge of dentistry as far as it applies to the development and preservation of children's teeth. My interest in the growth of the bony skeleton, particularly of the face and jaws, brings to my attention the disadvantages of malocclusion both as a result of and as a cause of deviations of growth of the hard parts.

To a less extent, yet far too often, I am made aware that infection of the mouth, teeth, gums and jaws may play their rôle in lowering children's health, if not actually causing, as they may, disease of the internal organs by extension of such infection. And I have to consider the possibility that some of the common diseases to which children are liable may affect the development and health of teeth and, therefore, secondarily, of nutrition and growth.

So, in all his work, even his work among infants, for the infant is making teeth even though they are unerupted, a pediatrician is closely allied to his confrère who occupies himself exclusively with dentistry. To him the pediatrician must come for help, for his is the skill which must remedy defects; and from him and his research, the pediatrician must learn the principles which underly the growth and development of this particular part of the body.

For hundreds of years, the sole function of the doctor was to cure illness, whether he did it by charms or by potions. When illness came to be regarded less as a visitation from God and more as a result of the carelessness of man, the possibility of avoiding illness came to be

*Read at the Sixty-Seventh Annual Meeting of the Massachusetts State Dental Society, May 5, 1931.

considered as an end to be striven for without fear of offending the Deity in the striving.

Thus, medicine gradually entered into the stage of prevention; and, in the last century and a half, preventive medicine has come to bulk large in the efforts of medical men. From the time of Jenner onward, one by one the great scourges of humanity have been attacked not only from the standpoint of curing them when they occur, but also from the standpoint of preventing their occurrence. We can hardly conceive today the possibility that there existed a time when smallpox was so prevalent that practically every child had it before he was 6 years old, and the inhabitants of a community were entered in the parish register as "have had smallpox" or "to have smallpox." Yet so it was before Jenner found that inoculation with cowpox prevented smallpox. We are approaching the eradication of diphtheria through determining susceptibility by the test of Bela Schick and immunization by balanced doses of diphtheria toxin and antitoxin. All the forces of good hygiene and the prevention of contact and reinfection are being enlisted to diminish the mortality and to stamp out the white plague, tuberculosis. And so it goes. Today, among civilized nations, the position of a community is in no small measure determined by the manner in which the principles of preventive medicine are applied toward the health of its people.

The dental profession, too, and in a shorter time, has gone from the cure of dental defects to their prevention. You were, perhaps, satisfied at first to relieve suffering from aching teeth, whether by extracting or by cleaning cavities; to restore a depleted apparatus of mastication by the making of dentures or to correct a malformed apparatus by the procedures of orthodontia; and to treat and cure infectious processes of the jaws, gums and teeth. Perhaps, as some physicians are willing to remain in the curative stage of medicine, some dentists are content to rest in the curative stage of dentistry. But just as it is the pride of the leaders in the medical branch of our common art to devote themselves to the utmost toward the extermination of the evils by treating which they earn their livelihood, so you who are leaders in dentistry have become apostles of the prevention of dental disease and disorders.

You have reason to be proud of the great amount of work which has been done to determine the manner of growth of the teeth and jaws and to discover the cause of dental caries, by whose ravages the greater part of your curative work is caused. This work has brought dentistry into line with the best that has been produced by its elder sister, Medicine; has aided in the elucidation of problems that are the common burdens of both professions, and has created a situation in which neither profession can proceed without the other.

But there is one further step which the medical branch of the profession is taking and which I think the dental branch must also consider. It requires the aid of all that prevention offers, but it takes into account also the optimum condition possible to the human organism. This further step is the building of health.

It is not enough that we shall keep a child from having diphtheria or his tooth from becoming carious. We must do all that we can to make him the strongest possible child, the happiest possible child, the most normally intelligent child. Undoubtedly, in the case of the tooth, the prevention of decay can hardly be differentiated in practice from making the tooth the healthiest possible. Thus I interpret the broad researches of recent

years into the cause and prevention of caries. But I still think, on principle, that if your approach to the problems of preventive dentistry is animated by the spirit of building health, it will be easier for you to see where, as dentists, you fit into the vast program for the physical betterment of the race.

The building of health means the guiding of growth, for, with children at least, growth is the touchstone which indicates the success of any health endeavor. We do not know what the impulse is which makes an organism grow, but we do know a good deal about the conditions which may modify growth to its advantage or disadvantage. Manifestly, it is for us to utilize the one sort and avoid, if possible, the other.

In our study of growth, we must go back to the beginning of life, and consider the effect of heredity, for the two streams of inheritance which focus on the newly fertilized human ovum bring characteristics which have been handed down from countless generations and which determine in large measure what sort of individual is going to be. During intrauterine life, the embryo is acted on by physical and by chemical forces which determine the manner in which the substrate of heredity shall be directed toward strength or weakness, health or ill-health. One of these forces is that due to the secretions of the endocrine glands, with a combination of which peculiar to itself each embryo or fetus is endowed. Modifications of the body in both bony skeleton and soft parts result from the activity of these combinations of internal secretions. Over their activity before birth, we have no control in the present state of the art.

Other factors which have to do with the growth and development of the coming child are related to the supply of nutritive material with which it builds its tissues. This supply comes from the mother. If she does not receive it, she cannot pass it on to her offspring. If she does not receive enough of it, she may either utilize for her own needs all or most of what she does receive, or draw on her own stores of nutritive material to the detriment of her own body.

Here, as in all nutritive problems involving growth, we have to consider the building materials. They are the proteins, the mineral salts and water. They, like the bricks and mortar in the building of a house, go to the construction of the tissues of the body. Also, we have to take into account certain other substances that do not enter into the structure which is being built but which determine whether the structure shall be well built. The secretions of the endocrine glands of which I have spoken are such substances; the so-called accessory food substances or vitamins are likewise of this class. Over these last, we have some control: we can insure that, with an adequate intake of building material, we have also an adequate intake of vitamins.

Another thing is necessary: all these food substances before being available for building the child must be worked over in the chemical laboratory of the mother's body so that they may come to the child in forms suitable to be built into the growing structure. In this working over, they are reduced to substances which have either an acid or an alkaline (or basic) reaction. If the total reaction of these end substances in the body of the mother tends toward the acid side, a condition less favorable to growth is produced; while a basic reaction favors growth.

There is a quantitative relationship also among the substances necessary to growth. Their interactions are very precise and the availability for growth of any one element may be limited by the amount

of another essential element which is supplied. To quote from Mendel: "The nutritive value of any mixture of food ingredients however abundant they may be is limited by the minimum quantity of any essential it may contain." This is "the law of minimum" applied to nutrition.

We have to see, then, that the pregnant woman receives nutriment sufficient to supply her own needs and to afford a store which may be passed on to her child growing *in utero*. It must contain the necessary proteins, mineral salts, vitamins and water present in food substances, which, when they have been metabolized, produce a general basic reaction; and these essential food elements must be given with due regard to the law of minimum.

Upon such simple bases rests the nutritional management of pregnancy which aims to produce a new-born child with normal organs, healthy tissues, good bones and the beginnings of sound teeth; and to leave intact the body of the mother.

The nutrition and growth of the infant rests on the same bases, except that his nutriment must be supplied to him directly unless he has that inestimable advantage of being breast fed.

If he is breast fed, the point of nutritional attack must again be the diet of the mother. In amount, she must receive food for her own metabolic needs, for the manufacture of milk and for the food material which the milk itself contains. Here again, if she does not receive the quantity and quality of nutriment necessary for all these three uses, she will either not supply an adequate amount for her child or will draw on her own reserves if she is a good milk producer. Mothers vary: some cannot produce good and sufficient milk even on an adequate diet. Such women become fat, while the child does not thrive. In lactation, particular emphasis must be laid on the vitamins, particularly vitamin B, which the mother under these circumstances needs in larger quantities.

Growth in the older child needs for its harmonious evolution still another factor which you, as dentists, have emphasized —the effect of function. In the bony structures particularly, function determines form. We see this in comparative anatomy. The kangaroo has developed on his leg bones osseous projections to give adequate attachment for the muscles by which he makes his great leaps. We see the effect of function in the straightening of the incurved legs of infants as they use their muscles in beginning to kick, to creep and to walk. You see it in the effect on the bones of the face and jaws when a modern diet, which requires less tearing and chewing effort than the diets of our savage progenitors, is given.

So, for the proper growth of the organs of mastication, to take but one part of the body, we must not only supply in the diet essential ingredients but also provide them in a form which will call forth the exercise of allotted function.

You will see from what has gone before that, since the principles of eugenics are not yet applied to the rearing of human beings, we have little or no control over the hereditary factors of growth. Over the endocrine factors, we have a little control when there is a marked lack of thyroid secretion, as in cretinism, when we can, by a replacement therapy, correct gross abnormalities and bring about an approach to the normal; but it is in the realm of nutrition that we have the greatest power.

So it is natural that, during the past three decades, there should have been a great deal of work done along these lines.

They say the happy man has no story.

The perfectly normal individual discloses not readily the conditions which have made him normal. It is in the study of deviations from the normal that the elements which make for the normal are discovered. So study of malnutrition and what we call the deficiency diseases has given us the greater part of our knowledge about the fundamentals of nutrition.

Great deviations from normal are the easiest to appreciate. With increasing knowledge, the slighter deviations become recognizable, and it is these slighter deviations which are the first to appear. Many decades after curvatures of the tibiae and deformities of the pelvis had been correctly referred to the disease called rickets, we came to be able to recognize the beginnings of this process in the roentgen-ray appearance of the growing bones. Countless sailors had suffered and died from scurvy and countless others had been cured by the giving of fruit juice before it was realized that a very short period of deprivation of vitamin C will serve to produce changes in the teeth which a research worker in dentistry can appreciate and which constitute the most delicate sign of the beginning of scurvy.

I consider as one of the great contributions to medicine the discovery that in the teeth, the one part of our bony structure that is exposed to view, we have perhaps the earliest and certainly one of the most delicate indices of nutritional deficiency.

Add to that the dictum that an unhealthy tooth means an unhealthy body; and you see at once where dentistry has enlarged the field of preventive medicine and the building of health; for this concept brings with it, from the medico-nutritional standpoint, the necessity of caring for millions of children who have not been regarded as having ill health from the point of view of the body as a whole, because the evaluation of their health status has been made with standards less fine than that which an appreciation of their dental ill-health affords.

"Why," you may ask, "all this talk about nutrition and the elements of nutrition? Does this have to do with the building of dental health?" It most assuredly does, and with the control of dental disease.

Two things, among others, have been demonstrated by your workers in research during the past decade or decade and a half. The first is that the fundamental cause of dental caries is an improper diet. The second is that defects in the development of the teeth and jaws can be produced, arrested or prevented to a large extent by dietary regulation.

We live in an artificial age and an age of large city populations. Most of us are far removed from the sources of food supply. The foods which we get must be prepared a long time in advance of their appearance on our tables. This means that they must be prepared so that they will keep. This often results in the removal of certain necessary portions of the foodstuff because these parts are likely to spoil, as the germ of wheat, which is removed in the milling of white flour. We have become particular in regard to the appearance of our food; and to appease our susceptibilities in this regard, the producers of foods often sacrifice the nutritive qualities to good looks. We have become lazy and too often choose soft foods, which do not stimulate adequately the function of mastication. As a nation, we have a sweet tooth; we consume large quantities of refined sugar, getting a goodly proportion of our carbohydrate, our energy requirement, from this, instead of making our own sugar by masticating and digesting coarse grains which give us exercise and supply vitamins as

well as energy. We have come to prefer the costlier cuts of meats, the muscles; and disdain the viscera, which are preferable as to proteins and iron and vitamins. We buy our vegetables and we tend to diminish our intake of these. On the whole, our civilization has led us into dietetic errors from which only science and intelligence can free us.

Anthropologists have found among savage races perfect dentition with little or no dental hygiene. The skulls of the aborigines of this continent, dying before the advent of the white man and the white man's diet, have shown beautiful teeth and jaws. At the present day in Hawaii, where excellent dental health work is being done, the usual prevalence of dental caries and defects is found in the communities which have adopted what might be denominated the American diet, while, in remote districts, where the children still have a native diet, there is very little caries; and in the Island of Guam, 83 per cent of the children have sound teeth. Filipinos coming to Hawaii have sound teeth; their children who eat a great deal of rice and have little or no milk have extensive dental decay. One can find the most interesting sort of reading on this subject in your literature.

In all the investigations, the common factor to emerge is the diet. The primitive diets held something which civilized diets all too commonly lack.

Nutritional research has shown that the adequate diet may be regarded as made up of approximately thirty-five relatively simple substances. Eighteen are digestive products of protein; one is the sugar glucose; ten are mineral elements; six are vitamins. "So far as we know," says McCollum, "any food supply which provides all of these thirty-five principles in the proper proportions will supply proper growth in the young and maintain health in the adult, provided it contain nothing deleterious."

Analyses of deficient diets show that they are lacking in calcium and vitamins A, C and D, and that they tend to produce an acid rather than a basic ash. I need hardly speak of the importance of calcium in relation to the health of bony structures, of which are the teeth. Calcium cannot be separated in our thought from phosphorus, for bone is essentially a structure made up of salts of these two elements laid down in a protein matrix. The question of calcium and phosphorus metabolism is too complicated to be considered here, but it is evident that unless a diet contains sufficient of these elements the bones and the teeth cannot be built with a normal consistency. Even if they be administered in quantities which are sufficient, there will be a lack in bones and teeth unless the factors which govern absorption and deposit are adequate.

Vitamin D, the fat-soluble substance, which exists in cod liver oil, egg yolk, etc., and which may be produced by ultraviolet rays acting on the skin, regulates the absorption and deposition of the salts of calcium and phosphorus in the bones and teeth. It is therefore a necessary constituent of the diet.

Vitamin A, also fat soluble, closely associated in cod liver oil with vitamin D, is essential to life and for protection against infection. The brilliant researches of one of your number have shown it to be essential to the proper development of the teeth.

Vitamin C, the antiscurvy vitamin, most abundantly found in the juice of citrus fruits, seems to be essential for the integrity of the supporting tissues. As Dr. Howe has shown, diets deficient in Vitamin C cause profound changes in the formation of the teeth. I shall not speak

of this more in detail, for his epochal work is familiar to you all.

There are other aspects of the nutritional problem, such as the effect of periods of great general bone growth on the growth of the teeth, brought out by studies on dental health, which are fascinating to one, who, like myself earns a goodly portion of his daily bread by regulating the daily bread of others; but I should only be bringing more coals to Newcastle did I transgress further on your patience in this regard.

When I spoke of the great opportunity which is yours in the field of public health, I can well imagine that many of you felt that I should rather have said "tremendous task," as you thought of the 45,000,000 children—to leave the adults out for a moment—who, in this country need dental service to supply which there are only 70,000 dentists. I admit that the figures are staggering, when we realize that of the 45,000,000 children, 95 per cent or thereabouts show dental caries and about 85 per cent suffer from major or minor defects of occlusion.

Yet, overwhelming as these figures are, tremendous task though it be to contemplate, it is a great opportunity. Its very mass makes it the easier to attack. It has a great public appeal. If only 5 per cent instead of 95 per cent of the children of this country suffered from dental caries, the need for proper care and for prevention would be just as great, but it would be much harder to convince the public of the need of what such societies as yours are preaching. When smallpox was rampant and everybody knew of its ravages, vaccination was hailed as the wonderful blessing it is; today, with smallpox a rarity as a result of vaccination, it is often difficult to persuade parents, and communities, that vaccination should be performed.

You are in an especially favored position. The great evil which you wish to attack is something which can be brought home to almost everybody because bad teeth can be seen and the pain of bad teeth can be appreciated, as well as the cost of caring for teeth when they have become bad and hurt. Then you have for this readily appreciable, widespread, bad situation a remedy which everyone can apply when you teach him how; which is not a medicine, nor a serum nor a vaccine; which violates no scruple or sense of personal liberty, but permits of a rather free choice of what everybody likes to take—food.

You ask yourselves, perhaps, "How can it be done? How can I, who have all that I can do in curative work, aid in prevention and the building of health?"

In the first place, you must convince yourselves that the building of dental health is worth while. I do not imagine that any of you will even think that the effort for dental health and the prevention of dental disease will interfere with your personal practices, a situation which has sometimes confronted the introduction of preventive measures in medicine. There is infinitely too much work waiting to be done; and at the most enthusiastic estimate, it will be years before the goal dentistry has set itself can be realized, for it is really the coming generations who will benefit most by your endeavors.

When you shall have convinced yourselves, the battle will be half won. It remains for you to familiarize yourselves with the principles of nutrition and dietetics. The science of nutrition is a highly technical one; the application of what the science of nutrition has demonstrated is comparatively simple. Many untrained persons are quite confident that they know perfectly well what people should and

should not eat. So that you who are trained need not fear the difficulties of mastering the nutritional principles which underlie dental health. But master them you should to be convincing in your propaganda.

This propaganda you will first direct toward your patients, all of them, parents and children alike, that those who are ailing may be made better and that the growing generation may be free.

You see women who are pregnant often before the obstetrician does. You know what he perhaps does not know or ignores, namely, that she should have a diet which will preserve her teeth during her pregnancy and provide building material for the deciduous teeth of her child, which begin to be laid down as early as the seventeenth week of gestation. Your advice to her, if you are carrying out a health service, will not consist merely in referring her to her doctor as regards her diet, but also in suggesting what sort of a diet she should take. Thereby, you will contribute to her well-being and the health of the teeth of her child and you will aid in the education of the obstetrician, who has much to learn not only as to the dental health of his patient, but also as to the effect of tooth infection on the obstetric complications that he encounters.

You see the nursing mother whose teeth have suffered a calcium loss during pregnancy, and you realize that although she may have supplied the necessary substances for the unerupted teeth of her offspring by the sacrifice of her own reserves, she may not be continuing to do so now that he has become a separate individual and she nourishes him with her milk, because of a diet which you know is insufficient, and which the pediatrician perhaps does not realize to be detrimental. Thus, you contribute again to the dental health of the mother and the child and to the education of the pediatrician.

For the obstetrician and the pediatrician need to have brought to them the gospel of dental health. Once they grasp it, they will realize how much it means to them in all that they have to accomplish and they will become, I doubt not, loyal aids to you in your campaign.

I believe it was the Sage of Concord who said, "When a principle is established, why multiply instances?" I shall go no farther, for I hope that a principle is established.

The dental profession has a wonderful opportunity in the realm of public health. The knowledge they have acquired of health and disease as related to the organs of mastication is based upon fundamentals which apply equally to the health of every part of the body. It is knowledge which should be in the possession of all who practice the art of healing, for it affects the well-being of a large proportion of the population.

True: Dentistry *is* a health service.

DIET AND TEETH

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THE subject "Diet and Teeth" leads us into one of the most interesting current topics of our time and one that has in it the possibilities of greatly influencing the future of both your profession and the medical profession. There is no theory which we wish to discuss with you more than the principles of normal nutrition, permitting you to see through the work of others how these principles of nutrition are being used to influence the health of teeth.

We shall discuss briefly, six subjects: carbohydrate, protein, fat, minerals, vitamins and roughage and water.

CARBOHYDRATE

The carbohydrates are derived from plant life. Their chemical structure is considered to be an aldehyde or a ketone derivative of complex alcohols. They are classified in three groups: monosaccharids: (1) glucose, (2) fructose and (3) galactose; disaccharids: (1) sucrose, (2) maltose and (3) lactose; polysaccharids: (1) starch, (2) dextrins, (3) glycogen, (4) gums and (5) cellulose.

For purposes of simplicity, we shall say that these substances are broken down during the processes of digestion to a simple monosaccharid called glucose and they are used in the body as such. It is the use of this glucose which is at the bottom of the metabolic activity of the body. It is fundamental that this process should be progressing with a good degree of rapidity. In the person with diabetes, we find one who cannot utilize this glucose well. A vast chain of symptoms begins to develop, and we find the individual not able to use protein or fat well, and from the processes of this poor combustion, severe illness and death may result. We are very dependent for life and energy on this combustion of glucose, and it is possible to bring about death in a very short period of time by forcing the combustion of this material to such a degree that the body stores are depleted and its functions cannot be maintained. The normal person should receive in twenty-four hours from 4 to 5 gm. of carbohydrate for every 2.2 pounds of body weight, or at least twice as much carbohydrate as fat, by weight. This should come from such foods as cereals, fruit, vegetables and milk.

PROTEIN

The next food constituent to be considered is the protein. The proteins are derived from both animal and plant life. Those proteins of animal source, such as meat, milk, fish, eggs, cheese and other milk products, are so-called "good quality proteins," while the proteins derived from the plant life such as vegetables and fruit are called "secondary quality proteins." About two-thirds of the protein requirements should come from the so-called good quality sources and about one-third may be derived from the secondary sources. The adult body needs in twenty-four hours from 0.66 to 1.00 gm. of protein for each 2.2 pounds

of body weight. The growing child or one who is recovering from a considerable weight loss needs more protein per pound of body weight than the healthy adult. The last two groups require from 1 to 2 gm. of protein for each 2.2 pounds of body weight. Protein is used for a different purpose in feeding than is carbohydrate. The latter is used for energy within the body, while protein is not drawn on principally for energy, but it is used to repair the wear and tear on the body protein and also to build up more protein in those who are forming it. A normal, healthy adult of about 150 pounds weight will require approximately 60 gm. of protein. This may be obtained by drawing upon the sources of good quality protein to the extent of a pint of milk, two eggs and three ounces of meat a day, and by drawing upon the secondary quality proteins, namely, vegetables and fruits, for the balance. Healthy, growing children and expectant and nursing mothers should have a quart of milk each day. It is felt that an excessive amount of protein is unnecessary and that whatever is taken above the needs throws an extra burden of work on the body; which may, in the presence of illness, aggravate the condition considerably. A necessary amount of protein must be fed to keep the body in nitrogen equilibrium, and if this is not done, the protein from one's body is utilized to the detriment of the organism.

The classification of proteins is complex. That chosen by the American Physiological Society and the American Society of Biological Chemists is given in Table 1.

It is fortunate that from the standpoint of nutrition, if we choose our so-called "good quality" and "secondary quality" proteins, as mentioned above, we do not need to burden ourselves with the details of this necessary, but confusing classification.

TABLE 1.—CLASSIFICATION OF PROTEINS

1. Simple proteins
   - a. Albumins
   - b. Globulins
   - c. Glutelins
   - d. Alcohol soluble proteins (protamins)
   - e. Albuminoids
   - f. Histones
   - g. Protamins
2. Conjugated proteins
   - a. Nucleoproteins
   - b. Glycoproteins
   - c. Phosphoproteins
   - d. Hemoglobins
   - e. Lecithoproteins
3. So-called derived proteins
   - A. Primary protein derivatives
     1. Proteans
     2. Metaproteins
     3. Coagulated proteins
   - B. Secondary protein derivatives
     1. Proteoses
     2. Peptones
     3. Peptides

FAT

The facts regarding the fats are not quite so confusing as those relating to the proteins. These substances occur in nature, both in plants and in animals. They are composed of the same elements as carbohydrates, that is carbon, hydrogen and oxygen, but these elements are arranged somewhat differently. The fats are broken down into two portions, namely, glycerin and fatty acids. The glycerin is further converted into glucose and used as such, while the fatty acid is used in different form.

It is important that the chemical process of the breaking down of fats proceeds along a certain definite path. If this does not occur, there is a place in the chemical chain where acetone is formed, and a condition of ketosis develops. This con-

dition may cause death and, in previous years, it was the most frequent cause of death in diabetics.

It is to be emphasized that this progression of the breaking up of fat within the body cannot be maintained unless the carbohydrates are being adequately oxidized. We may talk about carbohydrate, protein and fat separately, but once these three elements are placed within the body, there is a certain amount of interdependence which comes into play in their good use. The fats are very full of energy. They contain more than twice as many calories per given weight, and seem to sustain us longer than do the carbohydrates or proteins. The quantity of fat which may be used varies. In healthy adults, from 30 to 35 per cent of the calories necessary should come from fats.

MINERALS

It would appear from the work of Hanke,[1] Howe,[2] Drain,[3] Mellanby,[4] Marriott[5] and Davis[6] that mineral metabolism, as influenced by the vitamins, bids fair to be one of the most important and far-reaching influences in the control of dental caries. The work is too well done and too nearly universal to be without substantial foundation. As Hanke says, "All is not known," but sufficient is known that the programs which he suggests can influence dental caries to the stopping-point.

A brief résumé of the minerals and vitamins will be of help in pointing the way to possible further studies. The previous work in nutrition did not take the minerals into account, but the present approach allows considerable time for the study of mineral metabolism. Carbohydrates, proteins and fats furnish only five of the fifteen chemical elements which are known to be essential to human nutrition, so that ten elements must be furnished by ingredients other than these. The mineral elements are incorporated in the body as (1) bone constituents, (2) muscle and blood constituents and (3) soluble salts held in solution in the body fluids.[7]

The minerals which need to be mentioned are chlorin, sodium, potassium, magnesium, iodin, sulphur, phosphorus, iron and calcium. The minerals which we need should come from the food we eat, and that should come from the grocery store, rather than the apothecary shop, but it is important to know how to choose food wisely in order to get the best of mineral content. Sodium and chlorin are readily obtained in table salt. Magnesium, potassium, sulphur and phosphorus are obtained in sufficient amount if the diet is well balanced and there is an adequate amount of carbohydrate, protein and fat given for the body needs. Iron, in some instances of anemia, needs to be supplied artificially. Iodin is at times needed very badly, particularly in cases of simple goiter, where the thyroid gland is not functioning properly.

1. Hanke, T.: Relation of Diet to General Health and Particularly to Inflammation of Oral Tissues and Dental Caries, J. A. D. A., 17:957 (June) 1930.
2. Howe, P. R.: Diet as a Fundamental in Dental Conditions, J. A. D. A., 15:1673 (Sept.) 1928.
3. Drain, C. L.; Boyd, J. D., and Nelson, M. V.: Dietary Control of Dental Caries, Am. J. Dis. Child., 38:721 (Oct.) 1929.
4. Mellanby, Edward: Relation of Diet to Health and Disease (Caries of the Teeth and Diet), Brit. M. J., 1:667 (April 12) 1930.
5. Marriott, W. M.: Influence of Diet on Bones and Teeth, J. A. D. A., 17:1648 (Sept.) 1930.
6. Davis, S. L.: Dental Caries, Pacific Dent. Gaz., 38;584 (Sept.) 1930.
7. Sherman, H. C.: Chemistry of Food and Nutrition, Ed. 3, New York: The Macmillan Company, 1928.

This can be provided artificially with great simplicity.

Probably more attention is necessary as far as calcium is concerned. It holds true of nursing and expectant mothers. The rest of us, who have obtained adult stature, should have at least 2 glasses a day. It is apparent that we must not

TABLE 2. — DIETS USED TO ARREST DENTAL CARIES

Hanke	Boyd, Drain & Nelson	Davis	Marriott
Milk: ½ Pints	Milk: 1 quart	Milk: ½ pints	Milk Child, 1½ pints Adult, 1 pint Expectant Mothers, 1½ pints Infants, 1/10 body weight
Orange juice: ½-1 pint	Orange: 1	Orange: Juice of 2	
Fresh fruit: Any amount desired Lemon: Juice of ½	Fruit & Succulent vegetables 2 or more servings	Peaches or other fruits in season	Fruit, preferably oranges; one daily
Fresh vegetables Lettuce: ¼-½ head		Raw vegetable salad liberal helping Tomato juice Potato	Green vegetables: 2, preferably 1 raw
Eggs: 1 or 2	Egg: 1		Eggs: Adults, 2 Young child, 1 Infants, 1½-1 (After 5 months, egg yolk)
Meat		Meat—5 ounces	
	Butter: 1 ounce		Butter: 1-2 ounces
	Cod-liver oil: 1 tsp.	Cod-liver oil, especially prepared	
		Wholewheat bread Wholewheat or bran cereal	Some rough or hard food
		5 grain compound calcium tablet	

a closer relationship to the teeth than do the other minerals. The best source of calcium is milk. The growing child should have a quart a day. This is also only provide calcium to be utilized, but that the body must be able to use it after it is provided. In other words, the metabolism of calcium must be undisturbed.

Aids to the adequate use of calcium appear to be cod-liver oil, containing vitamin A and D, orange juice, containing vitamin C, and sunlight or artificial light. It is not known at the present time how calcium and these vitamins function together, or whether each is necessary for the other, but our best knowledge teaches us to say that they are dependent one on the other.

VITAMINS

The worker who first recognized the vitamins and named them thought that they were life giving amins. Their structure today is not known, and yet it is known that they are essential to existence and life. We are coming to feel more and more that even though the total absence of one or another vitamin might cause a gross appearance of disease, this disease may be present in an insipient form and we are not quite astute enough to recognize it. We know that vitamin C will eliminate and prevent scurvy, and it is a tendency on the part of the men who are working with problems of oral hygiene to feel that some of the manifestations present today, while they are not scurvy, could readily develop into scurvy if they were encouraged, and that they can be eliminated with abundant use of vitamin C.

Possibly, some people who are not quite up to par would be better off if they had an abundance of the various vitamins. These are readily obtained. The vitamins are grouped as to whether they can be dissolved in water or in fat.

The two vitamins which are soluble in water are vitamin B and vitamin C. Vitamin B prevents the disease of the nerves called beriberi and has to do with growth. Milk and the whole grain of cereals and fruit juices contain this vitamin.

Vitamin C deficiency causes scurvy. The influence of this vitamin on the teeth is being watched very carefully by Hanke, Howe and Drain and his coworkers. Vitamin C is abundant in orange juice, and it is suggested that the quantity sufficient for children and adults is about 8 ounces a day. Vitamin C is not so stable as vitamin B. Oranges, lemons, grapefruit, tomatoes and raw, leafy vegetables are abundant sources of vitamin C. The vitamin G (also called B_2) is also one of the water soluble vitamins. This is essential to growth and normal nutrition. Milk is said to be an excellent source of vitamin G.

Of the fat soluble vitamins, vitamins A and D are best known, while a more recent addition is vitamin E. A is an important vitamin, and its absence leads to an increased susceptibility to disease of the eye. It is felt that infections of the air passages are more readily acquired in the absence of sufficient vitamin A. This vitamin is found in its best form in milk and its products, eggs and green leafy vegetables.

Vitamin D is the vitamin which helps to prevent rickets. This has considerable to do with the utilization of calcium within the body. Cod-liver oil is a very excellent source of this vitamin. Recently, viosterol, a commercial concentrated preparation, has been used as a substitute for cod-liver oil. It should be remembered that while viosterol is adequate in its supply of vitamin D, it does not share with cod-liver oil the valuable vitamin A. Egg, milk and cream are good sources of vitamin D.

Vitamin E is a fat-soluble vitamin found by Evans. This is essential to reproduction. It is widely distributed and needs no special emphasis.

The so-called "life preservers" of Sherman of a pint of milk a day for

the adult, 2 eggs and liberal amounts of fresh fruits and vegetables will give adequate protection from the vitamin standpoint.

WATER

Water is an essential constituent of the diet for good health. As 60 per cent of the human body is composed of water, sufficient of this substance should be taken to provide adequate means of functioning. The body receives water from all fluids and from solid foods, and water also becomes available to the body in the processes of metabolism. McLester says that from 1 to 2 quarts of water a day in conjunction with that provided from the food should be sufficient. Care should be taken that drinking water with meals does not encourage bolting food.[8]

BULK

A sufficient quantity of bulky foods should be taken to stimulate adequate peristalsis of the intestinal tract. It is to be remembered that bulk within the intestine is a stimulus to action and, in the normal person, sufficient fruit and vegetables should be ingested to provide this bulky content. If the diet is well balanced and contains adequate amounts of carbohydrate, protein and fat, fruits and vegetables, together with sufficient water, the bulk requirements of the intestinal tract are met.

APPLICATIONS

It is only natural to wonder how these simple fundamentals may be worked into a feeding program which is adequate for health. Given a 150-pound man, let us arbitrarily say that, for moderate activity, he requires 35 calories of food for each 2.2 pounds of weight. This makes his needs about 2,400 calories. He should receive 4 gm. of carbohydrate for each 2.2 pounds, which is 268 gm., and 1 gram of protein for each 2.2 pounds, which is 67 grams, and sufficient fat to make up the balance of the calories, which is 118 grams.

By referring to Government Bull. No. 28,[9] the carbohydrate, protein and fat values of food may be obtained. The foods which are to be drawn on to fill these requirements are just the natural foods of the home. Care should be taken to see that those requirements as to milk, eggs, fresh vegetables and fruits, which have been mentioned, are maintained. The accompanying dietary is built upon this principle.

How can we expect these simple principles to aid us in regard to carious teeth? Let us turn for a minute to the work of Hanke and see what he has done. The diets which he has fed have placed particular stress on an abundance of vitamin C, because, as he says, "It is just the factor, in which the majority of diets are deficient." To obtain this he gives milk, from 1 to 2 pints; meat; fresh vegetables, from ¼ to ½ a head of lettuce a day; the juice of ½ a lemon; and ½ pint of orange juice once or twice a day, this depending on the age of the individual and on the susceptibility to a vitamin C deficiency; 1 or 2 eggs a day, and any desired amount of fresh fruit.

Let us now turn to the work of Howe, again a most careful observer and worker, who says, "The great incidence of caries today after the most painstaking measures of prevention fairly drives us back to a consideration of those fundamental principles concerned in building teeth of a resistant structure." These

8. McLester, J. S.: Nutrition and Diet in Health and Disease, Philadelphia: W. B. Saunders Company, 1929.

9. Atwater, W. O., and Bryant, A. P.: Chemical Composition of American Food Materials, U. S. D. A. Bull. No. 28.

principles he renumerates in part as follows:

When foods have been tested in living animals, it has been found in some instances that very definite effects on the cells are obtained. For example, a deficiency of fat soluble A causes the odontoblasts to lay down bone instead of dentin, which indicates that the odontoblast is merely a specialized type of bone cell or osteoblast. This results in a less dense and less resistant calcification of the tooth structure.

Ounces		How measured
	Breakfast	
8	Orange juice	1 glass
1	Rolled oats	1 average serving
¼	Sugar	¼ tablespoon
2	Cream, commercial	3⅓ tablespoons
1	Toast, whole wheat	1 medium slice
¼	Butter	1 pat (¼ inch thick)
½	Marmalade	¾ tablespoon
½	Bacon (uncooked wt.)	½ slice
	Egg, one	
8	Milk, whole	1 glass
	Lunch	
	Egg, one	
6	Tomato	1 medium
1	Lettuce	2 medium size leaves
¼	Mayonnaise	½ tablespoon
2	Bread, whole wheat	2 medium slices
½	Butter	2 pats
8	Milk, whole	1 glass
5	Apple	1 medium
1	Sugar	2 tablespoons
1	Cream, commercial	1⅔ tablespoons
	Dinner	
2	Beef, round	Slice—about 2½ by 1½ by ¾ inch
3½	Potato	1 medium
3½	Peas	1 average serving (½ cup)
3½	Lettuce	¼ large head
½	French dressing	1⅙ tablespoons
1	Bread, whole wheat	1 medium slice
½	Butter	2 pats
½	Jelly	½ tablespoon
7	Peaches (canned)	1 large serving

Food Value	
Carbohydrate	269
Protein	70
Fat	119
Calories	2,427

Another striking change in the odontoblast occurs when animals are fed diets deficient in antiscorbutic vitamin. In a few days (from five to seven), the odontoblast may be seen to have ceased forming dentin and the pulp to have shrunken away from the formed dentin. After a few more days, the formed dentin is resorbed or liquefies. On the administration of orange juice, new formation begins within twenty-four hours, and in a few days, the space between the pulp and old dentin is replaced with new dentin.

What really happens is that during a deficiency of antiscorbutic vitamin, the cells in supporting tissues of the body cease to form intercellular substance. Their recovery on the administration of the missing factor is very marked. The process appears to be one like the jelling or setting of liquid.

On the whole, our experience in feeding laboratory animals leads us to believe that the outstanding fault in our diet is the excessive use of meats and cereals to the exclusion of sufficient fruits, vegetables and milk. The latter food contains minerals, vitamins and protein, which in our experience with animals produce sound teeth and bone.[2]

Let us further examine the work of Boyd, Drain and Nelson.[3] This group of workers has used diets containing: 1 quart of milk, 1 egg, 1 teaspoon of cod-liver oil, 1 ounce of butter, 1 orange, two or more servings of succulent vegetables and fruit and such other foods as the child desired, candy being allowed after meals, but not at other times. No other noteworthy restrictions were used except that foods of a nonessential nature, or which might displace from the diet some prescribed items, were prohibited. With the use of this program, the following conclusions have been drawn by these workers.

No one food component has been proved as specific in the maintenance of dental integrity.

If the extensive use of sugars and starches is found associated with caries, it is probably because the extensive use of them has led to the omission from the diet of other essential foods, rendering the teeth susceptible to decay.

Dental caries has been arrested in many instances under divergent conditions of health and environment, by the ingestion of diets high in mineral and vitamin content.

Let us further examine the work of Marriott.[5] The criteria which he lays down as the principles of adequate diet from the standpoint of dental nutrition are:

A. Milk in any form—the most important constituent.
   1. Not less than 1½ pints a day for a child.
   2. Not less than 1 pint a day for an adult.
   3. Not less than 1½ pints a day for expectant mothers.
   4. An amount of one-tenth of the weight of the body daily for infants.

B. Butter, 1 or 2 ounces a day for an adult or child.

C. Eggs.
   1. Two daily for adults.
   2. One daily for young children.
   3. 1½ to one egg yolk daily for infants after the fifth month of life.

D. Green vegetables.
   1. Two every day, one of which should preferably be raw.

E. Fruit.
   1. One daily, preferably an orange.

F. Some rough or dry food.
   1. Zwieback, dry toasts, rough foods or cereal.

The last consideration is that of the work of Sherman L. Davis.[10] His feeding program consists of:

A. The diet.
   1. Wholewheat bread.
   2. Wholewheat or bran cereal.
   3. The juice of 2 oranges daily, tomato juice, peaches or other raw fruits in season.
   4. No candy. No chocolate bars.
   5. Very little pastry.
   6. About 5 ounces of meat a day.
   7. Potatoes once a day.
   8. From 1 pint to 1 quart of milk a day.
   9. A liberal quantity of a raw vegetable salad, at least once daily.

B. A 5-grain compound calcium tablet, which contains calcium and phosphoric acid in the proportion found in bone and dentin is prescribed twice daily.

C. An especially prepared cod-liver oil is used.

This program may be said to differ from the others in the consideration of the factors under B and C. (Table 2.)

As one views the situation for those factors which may be of benefit and those which may be a detriment, some interesting phases present themselves, as has been pointed out by the Council on Dental Therapeutics of the American Dental Association. We are fortunate that results have been obtained by three workers without the use of specially prepared calcium, phosphorus and cod liver oil.

It would appear that very marked benefit has come in the form of the ability to arrest dental caries from the adequate use of orange juice, milk, fresh and cooked vegetables and cod-liver oil.

Even though an individual receives milk, orange juice, fresh and cooked vegetables and cod-liver oil, he may not be adequately nourished and in our enthusiasm for the advances which have been obtained with these foods, let us not forget that those who have used them have employed them in good, well-balanced nutrition programs and that when one says that these foods should be given, it does not mean that other requirements, such as adequate caloric intake and adequate balance of carbohydrate, protein and fat, together with sufficient minerals, vitamins, bulk and water, should be neglected.

10. Davis, S. L.: Dietary Treatment for Dental Caries, Dent. Survey, 5:28 (Dec.) 1929.

THE TEETH IN RELATION TO DISEASE

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WHEN Charles H. Mayo makes a statement that "75 per cent of human ailments come from what goes into the mouth, including food and drink and the diseases of the mouth which cause local and general disease and focal infections, which may remain a cause of disease over a long period of time" (personal communication), combined with the well-known fact that infections of the mouth stand first in frequency as a cause of metastatic infections in other parts of the body, a study of the teeth and their relation to disease needs no apology for its introduction. This practical and clinical investigation on this subject has revealed etiologic relationship, pathogenesis and therapeutic indications, in the treatment of disease in general. It once more emphasizes what an important rôle the dentist plays in the understanding and treatment of disease. The dentist should know in which disease the eradication of dental focal infection is followed by good results and, conversely, in which by no results.

Three hundred and sixty-one consecutive office patients, composed of 108 males and 253 females, constitute the clinical material from which this study is made. These patients presented themselves at my office with various complaints regarding which an internist is consulted. In no sense were these picked or specialized patients such as those coming to a gastro-enterologist or a cardiac specialist.

In each case, every tooth was minutely examined and its condition ascertained. Each missing tooth was carefully noted. As a rule, it was found that when many teeth were missing, the remaining teeth were in a poor state. Conversely, when but few teeth were missing, the remaining teeth were in better shape. Evidently, the patient desired to retain at least some of his natural teeth, even though they were diseased.

The teeth were lost spontaneously or were extracted, in practically every instance, on account of their diseased condition, so that missing teeth can be taken as evidence of diseased teeth. In not a few instances, mistaken diagnosis was the cause of the removal of healthy teeth. This will be illustrated as we proceed with the text of the paper.

The diagnoses established as noted in the charts are as nearly correct as possible. Not only was a complete history taken and a thorough physical examination made in every instance, but most of the patients had roentgen-ray examinations and a thorough laboratory examination. Operations confirmed the diagnosis in some patients. No patient came to consult me about the teeth. Few patients were ultimately labeled with only one diagnosis. By far the greatest majority suffered from multiple diseases.

The missing teeth recorded in our table are classified under each one of the diseases. For instance, if a patient suffering from a gastric ulcer, cholelithiasis

and chronic appendicitis has five teeth missing, these teeth are recorded not only under gastric ulcer, but under cholelithiasis and appendicitis as well. While this method may lead to puzzling results in a few of the complications, where apparently yielding a false relationship between such complications and the teeth, in by far the great majority of such instances the result fully corroborated our present known existing relationship, and, in not a few cases, points to a more plausible revision of our present knowledge, linking certain diseases with bad teeth. For instance, we find that there is a great loss of teeth in obesity, which is at first glance hard to explain. But we known how frequently obesity precedes and coexists with diabetes, and the loss of teeth in diabetes is well known to everybody. It is therefore plausible that the great loss of teeth in obesity, as in diabetes, has most probably the same etiologic explanation. It is the illumination of puzzling and obscure facts about certain diseases by new information of this nature, contained throughout this paper, that justifies such a classification and the publication of this paper itself. While it is easy enough to see the relationship between bad teeth or the loss of teeth and the disease in question in most instances, in a few cases the explanation, with our present supply of knowledge, is hard to find. I feel that, in these instances, it is of even greater importance to marshal the facts, as some day one with greater knowledge and experience than I possess will not only correlate these facts and utilize them to explain our conception of hitherto obscure diseases, but even employ them for therapeutic purposes.

It is interesting to note that in the case of diseases which are hard to diagnose or to treat successfully, or both, the patient will sooner or later present himself before some doctor whose great panacea for all human ailments is wholesale teeth extraction. Also, prompted with the idea that he must try something new irrespective of its merit or logic, the patient finally winds up with edentulous jaws. We see this in such diseases as cirrhosis of the liver, cancer, etc., with, of course, no relationship between the teeth and the disease in question to be found. I believe that wholesale teeth extraction is too important a procedure and should not be undertaken so lightly. Positive dental pathologic indications, sound clinical experience and the aid of an immunologist and a bacteriologist form a quartet which is conducive for splendid results in the eradication of infected teeth for the treatment of general disease. This haphazard, careless tendency of "taking a chance" in wholesale tooth extraction leads to miserable results and professional disgrace.

No attempt was made to draw conclusions unless there were at least five or more cases under a given diagnosis. I realize that even this number is much too small. Age is a very important factor in our cases. As is well known and actually statistically demonstrated in a previous paper,[1] the older we are, the more teeth we will lose.

COCCYGODYNIA

At first glance, it is hard to correlate coccygodynia with extensive loss of teeth. There were six patients in this group who lost 75 per cent of their teeth. More teeth were lost in the lower jaw than in the upper jaw, and the bicuspids and molars of both jaws in particular suffered the greatest loss. But as all pa-

1. Lintz, William: Missing Teeth and Pregnancy, M. J. & Rec., 131: 452 (May) 1930.

tients were female, most of them with multiple pregnancies, and the coccygodynia was usually the penalty of a difficult labor, I believe that the 75 per cent loss of teeth can be explained more readily on the ground of many previous pregnancies[1] than by the coccygodynia. I do not believe that dental focal infection plays much of a rôle in coccygodynia, and if teeth were extracted with that in view, no results were obtained. This procedure should be discontinued.

CIRRHOSIS OF THE LIVER

There were six cases in the group having cirrhosis. Each patient lost on the average 21, or 65 per cent, of the teeth. More teeth were lost in the lower jaw than in the upper jaw (the converse of this is our experience in most of the other diseases). The molars and the bicuspids suffered most commonly. That dental focal infection is important in the etiology of cholecystitis and cholangitis is well known, and that the latter is a frequent factor in hepatic cirrhosis is recognized by every one. I do not know how much direct influence bad teeth have on hepatic cirrhosis. I believe that this is one of the diseases in which needless extractions are performed on account of the difficulty of establishing the diagnosis and of the unsatisfactory therapeutic results. In the future, it will be advisable to bear in mind the diagnosis of hepatic cirrhosis in cases of dubious indications for dental extraction.

VARICOSE VEINS

It is difficult to see why twenty patients with varicose veins should have lost 65 per cent of their teeth. But if one remembers that, in our cases, varicose veins are caused by pregnancy in practically every instance, and the great dental loss in the latter state is well known, this apparent anomaly becomes perfectly clear. The missing teeth are a result not of the varicose veins, but of the pregnancy which caused the varicosity.

CANCER

There were seven patients in the cancer group, each patient having lost 62 per cent of his teeth. I do not believe that this implies an etiologic relationship. The reason for the wholesale extraction lies in mistaken diagnoses, particularly at the beginning of the disease. The teeth are removed because these conditions are diagnosed as ulcer of the stomach, chronic gallbladder disease, chronic appendicitis, etc., in which we have a right to expect results from dental extraction. Age is also a factor in this malady.

DIABETES MELLITUS

Thirteen patients in the diabetes group had lost more than half of their teeth (56.25 per cent). The loss was fairly equally divided between the upper and lower jaws (122 and 120 teeth, respectively). The losses in both jaws were in the following order numerically: molars, bicuspids, central incisors, lateral incisors and cuspids. They are not lost haphazardly, but in a definite order. This symmetric loss of teeth as to number, kind and sequence is certainly very striking. There must be a reason for this loss in the order enumerated, although I do not know the explanation. Very frequently, the loss of teeth is the very first sign of diabetes.[2] These patients are first seen by the dentist and not by the physician. It behooves the dentist to make a urine examination for sugar in every one of these instances, or, better still, every dentist should be a physician. That there is a tremendous loss of teeth in diabetes

2. Lintz, William: Necessity of Interrelationship Between Physician and Dentist, Dent. Outlook, 12: 267-275 (July) 1925.

is well known. The explanation for this is not so clear and, I believe, is variable. Some patients have infected teeth, and the toxins and bacteria damage the islands of Langerhans. These cases show marked improvement when dental focal infection is eradicated. The dental infection comes first, the diabetes afterwards. In another group of cases and, by far the larger one, for it exists practically to a certain degree in every case, the hyperglycemia and the diabetic toxin lower the resistance of the tissue and form a favorable pabulum for the luxuriant growth of bacteria about the teeth, which become loose and diseased. A third factor is that in diabetes we not only have a disturbance of the carbohydrate, fat and protein metabolism, but of the calcium metabolism as well.

MENOPAUSE

There were thirty women in this group who suffered from symptoms which could be attributed only to the menopause. As a rule, their suffering was great. Only half of the teeth remained in their mouths. More teeth were lost in the upper than in the lower jaw. Aside from the consideration of age and previous pregnancies, which would play an important rôle in statistics of this nature, I wonder how much influence endocrine unbalance had on the calcium metabolism. That the endocrines have an important bearing on the calcium metabolism[3] is well known.

NEPHRITIS

There are ten nephritic cases in this group, with half of the teeth gone. More teeth are lost in the upper than in the lower jaw. I believe that there is an etiologic relationship; i.e. bad teeth are conducive to nephritis and dental infection should be eradicated. Striking results are seen in some cases of nephritis after the eradication of oral sepsis.

ESSENTIAL HYPERTENSION

There were eighty-six patients in this group having essential hypertension who lost 50 per cent of their teeth. Why essential hypertension should be associated with such a loss of teeth is not quite apparent to me. Undoubtedly, a very important factor is the menopause. In more than half of the women with symptoms of essential hypertension, the condition can be traced to the menopause.[4] I do not know of better evidence that the menopause is impending than the steady rise of blood pressure, without any other explainable cause, and that irrespective of the character of the menstrual flow at that time. By far the great majority of cases constituting this hypertension group of eighty-six patients were women. What explanation can be made for hypertension in men in this group is not known. Occasionally, I have seen splendid results in this disease after the eradication of badly infected teeth.[5] This suggests, in some cases at least, an etiologic relationship. Unfortunately, in the great majority of cases, this does not hold good. The age factor could not be the sole explanation. The relationship of the endocrine glands to essential hypertension I have described in a previous paper.[6]

3. Lintz, William: Teeth and Internal Secretory Glands, Dent. Cosmos, 68:943 (Oct.) 1926.

4. Lintz, William: Endocrines and Blood Pressure, M. J. & Rec., 123:744 (June 2) 1926. 1926.

5. Lintz, William: Important Phases of Essential Hypertension, M. J. & Rec., 126: 33 (July 6) 1927.

6. Lintz, William: Consideration of High Blood Pressure and Small Lungs, Internat. Clin., 4:176 (Dec.) 1927.

CEREBRAL HEMORRHAGE

What has been said under hypertension holds good in cerebral hemorrhage, for, as a rule, this is a sequel or a complication of hypertension.

HERNIA

There were thirteen patients in the hernia group with over 46 per cent loss of teeth for each patient. More teeth were lost in the upper jaw than in the lower jaw. I believe that this finding is purely accidental and that there is no relationship. We were dealing, for instance, with a patient having gastric ulcer who also had a hernia. In some cases, the hernia followed an operation for a disease in which there is a dental relationship, as in postoperative hernia following a gall-bladder operation. The fact remains that more than 46 per cent of their teeth were gone, which may be of interest to students of constitutional diseases.

ANGINA PECTORIS

There were seven patients in the angina pectoris group, each one having lost 46.75 per cent of his teeth. From a clinical, pathologic and therapeutic study of these cases, I believe that, in a great number of cases, there is a definite relationship between dental infection, especially periapical abscess, and diseased coronary arteries. No examination of a patient with angina pectoris is complete without a thorough roentgen-ray examination of the teeth, no matter how nearly perfect they may appear, because that fact does not exclude the possibility of periapical abscess. I have seen good therapeutic results from the eradication of dental sepsis.

Another cause for loss of teeth in this disease is mistaken diagnoses. The pain is not infrequently felt along the jaws in anginal attacks, and, at the beginning of the disease, this may be the only location. The dentist unwillingly removes tooth after tooth without any relief, until by the time the true character of the pain is recognized, the patient has edentulous jaws. It is wise to think of angina pectoris when wholesale dental extraction affords no relief of pain.

SUBCUTANEOUS HEMORRHAGES

There were five patients in the group having subcutaneous hemorrhages who lost more than 46 per cent of their teeth. These hemorrhagic areas, which vary greatly in size and color, are located beneath the skin, and I see them particularly in allergic disease. Capillary hemorrhage is a constant pathologic finding in anaphylaxis. I have seen these hemorrhages in other diseases. Something evidently renders the endothelial cells of the capillary permeable to the red blood cells, which extravasate into the surrounding tissue. Can it be that the toxins from infected teeth damage the endothelial cells? However, this is not a disease, but a symptom, and it would perhaps be more correct to consider it under allergy.

HEART DISEASE

There were seventy cases in the heart disease group who lost 42 per cent of their teeth. No clinician of experience will doubt nowadays that there is a definite etiologic relationship between infected teeth and heart disease. I have seen striking therapeutic results in heart disease follow complete eradication of dental focal infection, and immunization with autogenous vaccine. This should be practiced whenever possible. Many dentists regard heart disease as a contra-indication for the eradication of dental infection. On the contrary, it is a strong indication.

ARTHRITIS

More than 43 per cent of the teeth were gone in every one of the forty-five cases in the arthritis group. I believe that every one agrees regarding the etiologic relationship of infected teeth to the various forms of arthritis. Therapeutic results are to be obtained only if dental infection is eliminated. In this disease in particular, mistaken diagnosis is often the cause of extraction of healthy teeth.

UTERINE DISEASE

There were twenty-seven cases of uterine disease with an average loss of more than 43 per cent of the teeth. As the members of this group were all women who had undergone repeated pregnancies,[1] and as I have found in a previous study of women coming to this office that those who had undergone pregnancy had 42 per cent of the teeth missing, as contrasted with 17 per cent in those who had never been pregnant, and as the two figures practically correspond, I believe that the previous pregnancies are the explanation. There is a striking loss of teeth in pelvic disease where no such explanation can be made. More experience is necessary in order to ascertain whether there is any relationship between pelvic disease and the teeth.

SINUSITIS

More than 43 per cent of the teeth were gone in the seven cases comprising the sinusitis group. Abscessed teeth can cause sinusitis, not only by direct extension, but also by way of the lymphatics. Before the eradication of sinusitis is undertaken for the relief of systemic disease, the teeth should be examined by roentgen-rays for infection, because of the frequent existence of this combination. Frequently, the failure to obtain therapeutic results in an internal disease such as arthritis after sinus treatment is due to the fact that periapical infection of the teeth remains. Infective conditions from the upper teeth are the commonest cause of maxillary sinusitis. In any disease of the accessory sinuses of the nose, if the teeth are found diseased, they should be treated before the sinus operation.[7]

AORTIC DISEASE

More than 40 per cent of the teeth were gone in the twenty-one patients having aortic disease. Age, of course, would be an important factor in this disease as this condition occurs mainly in old people. How much of a factor is dental infection in aortic disease? I believe that the word negligible will express the opinion of the medical profession. At the same time, in view of these statistics, I shall pay more attention to this relationship in the future than I have in the past.

HEMORRHOIDS

More than 40 per cent of the teeth were gone in twenty-three patients having hemorrhoids. I believe that the considerations under varicose veins hold good here. The heart is but a slight factor in my series of cases.

PEPTIC ULCER

There were twenty-six cases of peptic ulcer, with more than 40 per cent of the teeth gone. Not only were the losses in both jaws pretty nearly equal, but the losses of the various upper teeth strikingly approximated those of the lower jaw. I believe that every one admits today the etiologic relationship of bad teeth to gastric duodenal ulcers. I insist upon a roentgen-ray examination of the teeth, irrespective of their condition before be-

7. Cohn, L. R.: Oral Sepsis in Relation to Eye, Ear, Nose and Throat Disease, New York M. J., 118:168 (Aug. 1) 1923.

ginning treatment. I find that delay in therapeutic results and recurrences are due to dental infection. In my experience, the eradication of dental focal infection is by far the most important procedure in the treatment of this disease.

OBESITY

More than 37 per cent of the teeth were gone in sixty-six obese patients, and were identical to the teeth in diabetes in order of loss.

Why should obese people lose more than 37 per cent of their teeth? I believe it is because they are potential diabetics, and the loss of the teeth in diabetes is too well known to mention. Joslin[8] has ventured the assertion that diabetes is largely a penalty of obesity, and the greater the obesity, the more likely is Nature to enforce the law. Adams,[9] of the Mayo Clinic, has shown that 91 per cent of the patients have been overweight and that 82.9 per cent have been more than 10 per cent overweight before diabetes developed. There is little difference between the sexes. The unpreventable causes of obesity, Adams concludes, may be age, sex, heredity, previous diseases and various disturbances of the endocrine glands, including those which take place at the menopause. In any event, each succeeding complication of ascertainable facts only serves to emphasize anew that education regarding obesity should help in averting diabetes.

The missing teeth in both diabetes and obesity is another link in the chain of evidence that the diseases are closely related.

I believe that these patients have a marked disturbance not only in fat metabolism, but also in calcium metabolism, and that is why they lose their teeth.

INFECTED TEETH

Fifty patients were placed in the infected teeth group because their teeth were unusually badly infected. Besides this, each patient lost more than 37 per cent of his teeth. In practically all the patients, the mouth showed a decided acid reaction to litmus paper.

GALLBLADDER DISEASE

There were 120 patients having gallbladder disease, with 37.5 per cent of the teeth gone. Twelve cases of cholelithiasis are placed in this group. The infectious factor in the etiology of cholelithiasis, in some cases, is admitted by every one. It is interesting to note how closely in these cases loss of teeth, including the sequence in which they are lost, resembles the loss of teeth in cholecystitis. This would add another link to the chain of evidence that there is a close relationship between cholecystitis and cholelithiasis.

It is an established fact that there is a close etiologic relationship between infected teeth and gallbladder disease. No treatment of gallbladder disease, whether it be medical or surgical, is complete today without the thorough eradication of dental focal infection. The results quite often exceed our fondest expectations.

FLAT FEET

There were six cases of flat feet, with 37.5 per cent of the teeth missing. As I know of no relationship between infected teeth and flat feet, I would be inclined to explain the small number of cases in this group on the ground of purely accidental findings. This fact may be of interest to students of constitutional diseases.

8. Joslin, E. P.: Treatment of Diabetes Mellitus, Phila.: Lea & Febiger, 1928.

9. Adams, S. F.: Obesity as Precursor of Diabetes, J. Nutrition, 1:339 (March) 1929.

ENDOCRINES

Each patient with endocrine disturbances had lost 41 per cent of the teeth. There were 161 patients in this group.

It is rather difficult to explain why disturbance in the endocrines should be associated with such a marked loss of teeth. As this group is fairly large, merely accidental findings can be excluded. If we take this extensive loss of the teeth as an index of infection, for, as previously noted, whether the teeth were lost spontaneously or extracted artificially, the underlying cause in practically every instance is infection, I wonder whether the endocrines are not damaged by the bacteria and their toxins arising from dental infection, to a much greater extent than we heretofore supposed. Or is the converse true? Just as certain constitutional endocrine stigmata, particularly familial in type, are associated with marked loss of hair, so are these endocrine disturbances associated with marked loss of teeth. I do not know how to explain the striking definite orderly loss of teeth which can be found existing in both jaws alike, in so many of the diseases enumerated in this paper, except on an endocrine basis. Can it be that the various teeth are intimately associated with and controlled by the various endocrine glands? Otherwise, why should the molars be the first teeth to go and the cuspids the last? Again and again, I have seen every tooth in the head gone except the cuspid. Whatever the explanation may be, it is interesting and important that there is a marked loss of teeth in endocrine disease.[10]

CONSTIPATION

There were fifteen members in the group suffering from constipation who had lost 37.5 per cent of the teeth. I believe that these statistics emphasize the importance of bad teeth in digestion and the production of gastro-intestinal conditions which result in constipation. The harmful effects of bad teeth in this condition is twofold; namely, mechanical, resulting in faulty mastication, and metastatic dissemination of infection resulting in the various digestive diseases.

NEPHROLITHIASIS

Fifteen patients in the nephrolithiasis group lost 34.5 per cent of the teeth. This confirms clinically the experimental work of Rosenow[11] on dogs. He was able to reproduce kidney stones in healthy dogs, by inoculation with bacteria obtained from dental foci of infection in patients suffering from nephrolithiasis. Along with the usual treatment, the elimination of all dental focal infection would certainly be a therapeutic indication in all cases of nephrolithiasis in order to prevent its recurrence.

HYPOTENSION

It is difficult to see the relationship of infected teeth to hypotension. I was always under the impression that this condition was distinctly inherited. I shall look more carefully in the future for any relationship that may exist. Machet[12] has found more than 80 per cent of 1,500 cases with two or more pulpless teeth in association with a subnormal blood pressure and secondary anemia.

10. Lintz, William: Endocrines in Relation to Dentistry, Internat. J. Orthodontia, 12: 531 (June) 1926.

11. Rosenow, E. C.: Results of Experimental Studies of Focal Infection and Elective Localization, M. Clinics N. America, 5: 573 (Sept.) 1921.

12. Machat, B. B.: Prevalence of Oral Disease and Its Insidious Effect on General Health, New York M. J., 118:165 (Aug. 1) 1923.

TABLE 1.—TEETH MISSING IN DISEASE

Diagnosis	Cases	Upper Central Incisor	Upper Lateral Incisor	Upper Cuspid	Upper Bicuspid	Upper Molar	Total, Upper Jaw	Lower Central Incisor	Lower Lateral Incisor	Lower Cuspid	Lower Bicuspid	Lower Molar	Total, Lower Jaw	Total, Both Jaws	Average	Percentage
Cystitis	2	4	4	4	8	12	32	4	4	4	8	12	32	64	32	
Senile Tremor	2	4	4	4	8	12	32	4	4	4	8	12	32	64	32	
Pigmentation	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Chloasma	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Scleroderma	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Gout	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Menière's disease	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Intermittent claudication	1	2	2	0	4	6	14	2	2	2	4	6	16	30	30	
Conjunctivitis	1	2	2	2	4	6	16	0	0	0	4	6	10	26	26	
Laryngitis	1	2	2	2	4	6	16	0	0	0	4	6	10	26	26	
Bell's palsy	3	4	4	5	11	15	39	4	4	2	8	16	34	73	24	
Hallux valgus	2	0	0	0	6	10	16	4	4	4	8	12	32	48	24	
Coccygodynia	6	6	6	6	20	28	66	10	10	10	20	31	81	147	24	75.00
Phlebitis	1	2	2	2	4	6	16	0	0	0	2	5	7	23	23	
Cirrhosis	6	10	10	9	18	28	75	6	6	6	12	25	55	130	21	65.00
Varicose veins	20	28	29	30	57	88	232	20	20	21	48	80	189	421	21	65.00
Cancer	7	10	10	10	16	31	77	6	7	7	15	32	67	144	20	62.00
Bechterew's disease	1	2	2	2	4	6	16	2	2	0	0	0	4	20	20	
Cerebral hemorrhage	8	10	10	8	19	32	79	8	10	5	23	42	88	167	20	62.50
Influenza	1	2	2	2	4	6	16	0	0	0	3	1	4	20	20	
Neurasthenia	4	4	5	4	12	14	39	4	4	4	10	18	40	79	19	
Malaria	2	2	2	3	5	7	19	2	2	2	5	9	20	39	19	
Secondary anemia	3	4	4	4	8	12	32	2	3	2	6	11	24	56	18	
Diverticulitis	2	2	2	2	8	12	26	0	0	0	3	8	11	37	18	
Diabetes	13	17	16	13	40	36	122	15	12	12	29	52	120	242	18	56.25
Kyphosis	1	2	1	2	4	6	15	0	1	1	1	0	3	18	18	
Visceroptosis	4	4	4	4	8	12	32	4	4	4	13	12	37	69	17	
Nephritis	10	12	12	12	24	42	102	6	6	6	19	26	63	165	16	50.00
Essential hypertension	86	90	87	85	197	314	773	70	60	58	172	251	611	1384	16	50.00

Achylia gastrica	4	4	4	4	10	12	34	4	4	4	8	13	33	67	16	
Taenia versicolor	4	4	4	3	9	8	28	4	4	4	6	18	36	64	16	
Boils	1	2	2	1	1	3	9	1	0	0	2	3	6	15	15	
Mumps	1	2	2	0	2	5	11	1	0	0	0	3	4	15	15	
Hernia	13	13	13	12	11	23	72	13	14	9	36	49	121	193	15	46.75
Angina pectoris	7	6	6	5	16	23	56	6	6	6	12	19	49	105	15	46.75
Subcutaneous hemorrhages	5	4	5	5	18	18	50	0	0	0	4	21	25	75	15	46.75
Pruritis	3	3	4	2	4	10	23	2	2	2	4	11	21	44	14	
Deafness	2	2	4	2	6	8	22	0	0	0	1	6	7	29	14	
Arthritis	45	40	40	36	100	148	364	29	25	20	70	155	299	663	14	43.75
Rheumatic	7	2	2	0	10	10	24	0	0	0	3	16	19	43	6	
Arthritis, chronic	38	38	38	36	90	138	340	29	25	20	67	139	280	620	16	
Uterus	27	27	25	26	61	97	236	8	8	9	41	91	157	393	14	43.75
Fibroid	9	8	6	8	19	27	68	2	2	2	15	32	53	121	13	
Enlarged	2	4	4	4	8	12	32	2	2	2	5	12	23	55	27	
Retroverted	1	0	0	0	1	6	7	0	0	0	3	4	7	14	14	
Endocervicitis	7	7	7	7	20	30	71	4	2	3	7	17	33	104	14	
Endometritis	4	0	0	0	2	4	6	0	0	0	1	10	11	17	4	
Procedentia	4	8	8	7	11	18	52	0	2	2	10	16	30	82	20	
Prolapsed uterus	2	4	4	3	5	9	25	0	1	1	3	5	10	35	17	
Rectocele and cystocele	1	2	2	2	2	3	11	0	1	1	3	5	10	21	21	
Procedentia	1	2	2	2	4	6	16	0	0	0	4	6	10	26	26	
Sinsusitis	7	6	6	6	15	23	56	4	4	4	14	21	47	103	14	43.75
Diseases of the heart	70	58	62	57	125	225	527	45	42	38	107	200	432	959	13	42.00
Myocarditis	50	45	47	41	97	178	408	34	31	29	76	147	317	725	14	43.50
Cardiac decompensation	3	5	4	3	5	13	30	2	2	0	5	12	21	51	17	
Myocarditis	47	40	43	38	92	165	378	32	29	29	71	135	296	674	14	
Cardiac hypertrophy	7	4	6	5	10	17	42	4	4	4	9	15	36	78	11	34.25
Endocarditis	13	9	9	11	18	30	77	7	7	5	22	38	79	156	12	37.50
Mitral stenosis	5	5	4	5	9	15	38	3	4	2	9	16	34	72	14	
Mitral regurgitation	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Endocarditis	6	4	5	6	9	15	39	4	3	3	13	22	45	84	14	
Aortic sclerosis	21	19	19	16	38	67	159	12	12	13	39	52	128	287	13	40.50
Aortitis	2	0	0	0	0	0	0	0	2	0	4	6	12	12	6	
Aortic sclerosis	12	13	13	10	24	48	108	8	6	7	21	29	71	179	14	
Dilated aorta	7	6	6	6	14	19	51	4	4	6	14	17	45	96	13	
Hemorrhoids	23	15	17	14	41	76	163	12	12	10	35	86	155	318	13	40.50

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TABLE 1.—TEETH MISSING IN DISEASE (Continued)

Diagnosis	Cases	Upper Central Incisor	Upper Lateral Incisor	Upper Cuspid	Upper Bicuspid	Upper Molar	Total, Upper Jaw	Lower Central Incisor	Lower Lateral Incisor	Lower Cuspid	Lower Bicuspid	Lower Molar	Total, Lower Jaw	Total, Both Jaws	Average	Percentage
Ulcer	26	15	16	17	48	74	170	15	16	14	42	80	167	337	13	40.50
Gastric	12	9	8	9	24	38	88	7	8	6	20	37	78	166	13	
Duodenal	13	4	6	6	20	30	66	6	6	6	18	37	73	139	10	
Tongue	1	2	2	2	4	6	16	2	2	2	4	6	16	32	32	
Psoriasis	4	2	2	2	9	13	28	2	2	2	6	14	26	54	13	
Pyelitis	4	2	2	2	4	8	18	3	4	3	8	16	34	52	13	
Herpes zoster	2	4	3	2	5	7	21	0	0	0	2	4	6	27	13	
Obesity	66	46	54	42	127	202	471	31	30	30	96	197	384	855	12	37.50
Infected teeth	55	39	43	38	101	163	384	24	20	19	64	168	295	670	12	37.50
Cholecystitis	120	86	93	55	217	364	815	50	46	49	138	237	520	1335	12	37.50
Cholelithiasis	12	10	12	7	28	43	100	3	0	1	7	25	36	136	11	
Cholecystitis	108	76	81	48	189	321	715	47	46	48	131	212	484	1199	12	
Flat feet	6	5	5	5	9	15	39	2	2	4	9	18	35	74	12	37.50
Tachycardia	2	2	2	2	3	4	13	0	0	0	2	9	11	24	12	37.50
Constipation	15	8	8	8	24	45	93	6	6	6	26	44	88	181	12	37.50
Endocrines	151	107	110	91	255	409	972	76	75	73	216	456	896	1868	11	41.00
Hyperthyroid	41	19	21	17	51	82	190	9	10	12	45	103	179	369	9	
Hypothyroid	12	6	4	4	15	31	60	5	4	4	10	36	59	119	9	
Dysthyroid	6	4	4	2	9	9	28	2	2	2	6	16	28	56	9	
Exophthalmic goiter	14	8	8	8	18	29	71	3	3	4	14	32	56	127	9	
Cystic thyroid	2	2	2	2	4	8	18	2	2	2	4	7	17	35	17	
Cystic ovary	8	6	6	6	15	22	55	4	4	4	10	19	41	96	12	37.50
No axillary hair	19	24	24	21	46	70	185	20	21	16	44	81	182	367	19	
Hirsutism	1	2	2	2	4	6	16	2	2	0	0	0	4	20	20	
Vicarious menstruation	1	0	0	0	0	4	4	0	0	0	0	4	4	8	8	
Amenorrhea	2	2	2	2	5	9	20	0	0	0	2	3	5	25	12	
Dysmenorrhea	3	4	4	2	8	15	33	3	3	3	9	15	33	66	21	
Endocrine, mixed types	35	24	29	21	67	111	252	26	24	24	67	126	267	519	14	
Froelich's syndrome	7	6	4	4	13	13	40	0	0	2	5	14	21	61	8	

Pleuritis	4	4	4	2	6	11	27	2	2	2	5	9	20	47	11	
Reynaud's disease	3	2	3	1	6	10	22	0	0	0	4	9	13	35	11	
Nephrolithiasis	15	13	10	11	23	43	100	4	4	4	19	42	73	173	11	
Hypotension	11	5	7	5	14	28	59	4	4	4	16	34	62	121	11	
Sterility	4	4	3	2	6	7	22	2	2	4	7	7	22	44	11	
Allergy	130	74	82	69	189	356	770	52	44	47	145	336	624	1394	10	31.25
Gastro-intestinal tract	7	0	0	0	8	9	17	0	0	0	0	17	17	34	4	
Genito-urinary tract	1	0	0	0	0	4	4	0	0	0	0	4	4	8	8	
Respiratory tract	3	0	0	0	3	0	3	0	0	0	1	2	3	6	2	
Skin	41	20	20	17	54	93	204	13	11	11	44	94	173	377	9	
Asthma	36	22	25	25	52	105	229	17	15	19	43	88	182	411	11	
Eczema	7	3	5	1	7	15	31	4	2	3	6	16	31	62	8	
Hay-fever	6	2	3	3	4	17	39	0	0	0	4	16	20	49	8	
Migraine	22	15	17	15	39	79	165	14	12	10	36	71	143	308	14	
Mucous colitis	7	12	12	8	22	34	88	4	4	4	11	28	51	139	19	
Bursitis	2	0	0	0	4	8	12	0	0	0	4	4	8	20	10	
Appendicitis	49	26	25	25	76	126	278	16	12	12	48	120	208	486	9	28.00
Tuberculosis	34	14	19	15	51	69	168	10	11	11	34	75	141	309	9	28.00
Atrophy of bone	1	0	0	0	2	3	5	0	0	0	1	3	4	9	9	
Strabismus	2	2	2	0	4	6	14	0	0	0	0	2	2	16	8	
Leukorrhea	2	0	0	0	1	7	8	1	0	0	3	5	9	17	8	
Trichinosis	1	0	2	0	2	0	4	0	0	0	2	2	4	8	8	
Syphilis	3	1	1	0	5	5	12	2	0	0	0	8	10	22	7	
Tonsils	17	6	9	7	19	32	73	2	2	0	17	37	58	131	7	21.75
Abscess	1	0	0	0	0	0	0	0	0	0	4	6	10	10	10	
Tonsillitis	16	6	9	7	19	32	73	2	2	0	13	31	48	121	7	
Anomalies	2	2	0	0	1	5	8	0	0	0	1	6	7	15	7	
Hammer fingers	1	2	0	0	1	5	8	0	0	0	1	6	7	15	15	
Cervical rib	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Xanthomas	1	0	0	0	1	2	3	0	0	0	1	3	4	7	7	
Adhesions	15	4	6	4	14	28	56	0	2	2	5	32	41	97	6	18.75
Abscess of lung	1	1	2	0	0	1	4	0	0	0	0	2	2	6	6	
Emphysema	1	0	0	0	0	0	0	0	0	0	0	6	6	6	6	
Ureteral stricture	4	0	0	0	2	4	6	2	0	2	1	9	14	20	5	
Phlebectasia	2	0	0	0	2	5	7	0	0	0	0	4	4	11	5	
Gonorrheal arthritis	2	0	0	1	2	3	6	0	0	0	1	3	4	10	5	
Lipoma	2	0	0	0	0	1	1	2	2	2	1	4	9	10	5	

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TABLE 1.—TEETH MISSING IN DISEASE (Continued)

Diagnosis	Cases	Upper Central Incisor	Upper Lateral Incisor	Upper Cuspid	Upper Bicuspid	Upper Molar	Total, Upper Jaw	Lower Central Incisor	Lower Lateral Incisor	Lower Cuspid	Lower Bicuspid	Lower Molar	Total, Lower Jaw	Total, Both Jaws	Average	Percentage
Synchondrosis	2	0	0	0	3	3	6	0	0	0	1	3	4	10	5	
Epilepsy	1	0	0	0	0	0	0	0	1	0	0	4	5	5	5	
Bronchitis	9	3	1	2	1	7	14	4	2	4	13	15	38	52	5	15.75
Nonerupted teeth	19	6	1	1	10	14	32	2	2	0	21	42	67	99	5	15.75
Pyorrhea	6	0	1	1	2	11	15	0	0	0	1	12	13	28	4	12.50
Gonorrhea	2	0	0	0	4	1	5	0	0	?	0	4	4	9	4	
Rickets	7	0	2	2	4	6	14	0	1	0	1	8	10	24	3	9.25
Pneumonia	2	1	2	0	0	1	4	0	0	0	0	2	2	6	3	
Hordeolum	2	0	0	0	1	0	1	0	0	0	0	5	5	6	3	
Ingrown toenail	1	0	0	0	0	2	2	0	0	0	0	1	1	3	3	
Ascaris lumbricoides	1	0	0	1	0	0	1	0	0	0	0	2	2	3	3	
Abscess	5	0	0	0	1	1	2	0	1	0	0	10	11	13	2	6.50
Finger	2	0	0	0	1	0	1	0	0	0	0	5	5	6	3	
Perinephritic	1	0	0	0	0	1	1	0	0	0	0	2	2	3	3	
Foot	2	0	0	0	0	0	0	0	1	0	0	3	4	4	2	
Erythromelalgia	1	0	0	0	0	1	1	0	0	0	0	1	1	2	2	
Impotence	1	0	0	0	0	0	0	0	0	0	1	1	2	2	2	
Nephroptosis	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	
Rhinitis	3	0	0	0	0	0	0	0	0	0	3	2	5	5	1	
Chorea	3	0	2	0	0	0	2	0	0	0	0	0	0	2	0	
Osteomyelitis	2	0	0	0	0	0	0	0	0	0	0	1	1	1	0	
Angioneurotic edema	3	0	0	0	0	1	1	0	0	0	0	1	1	2	0	
Pregnancy	4	0	0	0	1	1	2	0	0	0	0	1	1	3	0	

TABLE 2.—TEETH MISSING IN NORMAL PERSONS

AGE	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	
						Males							
Upper Jaw													
No. Cases	4	1	12	11	3	4	6	2	2	1	1	1	48
Central incisor	0	0	3	0	0	4	2	0	0	2	0	2	13
Lateral incisor	0	0	2	2	0	4	2	0	0	2	0	2	14
Cuspid	0	0	0	0	1	4	2	1	0	2	0	2	12
Bicuspid	0	0	2	2	0	7	4	1	2	4	1	4	27
Molar	0	0	9	6	2	16	9	0	7	6	2	6	63
Lower jaw													
Central Incisor	0	0	0	0	0	4	4	0	0	0	0	2	10
Lateral Incisor	0	0	0	0	0	4	4	1	0	0	0	2	11
Cuspid	0	0	0	0	0	4	4	0	0	0	0	2	11
Bicuspid	0	0	0	0	1	8	10	0	0	0	0	4	23
Molar	0	0	9	5	2	12	15	0	5	3	2	6	59
Total missing	0	0	25	15	6	67	56	3	14	19	5	32	242
Average per person	0	0	2.1	1.4	2	16.8	9.3	1.5	7	19	5	32	5.0
Upper jaw						Females							
No. Cases	0	11	8	3	6	9	6	4	3	1	1	0	52
Central Incisor	0	2	2	0	0	5	6	3	2	0	0	0	20
Lateral incisor	0	2	2	0	0	4	6	5	2	0	0	0	21
Cuspid	0	0	0	0	0	6	4	4	2	0	2	0	18
Bicuspid	0	1	0	0	0	11	12	9	5	1	0	0	39
Molar	0	1	2	3	0	23	22	15	15	0	0	0	81
Lower jaw													
Central Incisor	0	0	0	0	0	0	4	2	2	0	0	0	8
Lateral incisor	0	0	0	0	0	0	3	3	2	0	0	0	8
Cuspid	0	0	0	0	0	1	4	2	1	0	1	0	9
Biscupid	0	3	0	0	0	6	8	5	3	0	1	0	26
Molar	0	0	2	5	2	29	16	13	9	3	1	0	80
Total missing	0	9	8	8	2	85	85	61	43	4	5	0	310
Average per person	0	.9	1.0	2.6	0.3	9.5	14.2	15.2	14.3	4	5	0	5.9
Upper jaw						Total Cases							
No. Cases	15	9	15	17	12	10	10	5	3	1	2	1	100
Central incisor	2	2	3	0	5	10	5	2	0	2	0	2	33
Lateral incisor	2	2	2	2	4	10	7	2	0	2	0	2	35
Cuspid	0	0	0	0	7	8	6	3	0	2	2	2	30
Bicuspid	1	0	2	2	11	19	13	6	3	4	1	4	66
Molar	1	2	12	6	25	38	24	15	7	6	2	6	144
Lower jaw													
Central incisor	0	0	0	0	0	8	6	2	0	0	0	2	18
Lateral incisor	0	0	0	0	0	7	7	3	0	0	0	2	19
Cuspid	0	0	0	0	1	8	6	1	0	0	1	2	19
Bicuspid	3	0	0	0	7	16	15	3	0	0	1	4	49
Molar	0	2	14	7	31	28	28	9	8	3	3	6	139
Total missing	9	8	33	17	91	152	117	46	18	19	10	32	552
Average per person	.6	.9	2.2	1.0	7.6	15.2	11.7	9.2	6	19	5	32	5.5

	No. cases	No. missing teeth	Per cent missing
Males,	48	242	15.8
Females,	52	310	18.7
Both sexes,	100	552	17.6

ALLERGY

There were 130 members of the group suffering from various forms of allergy. More than 31 per cent of their teeth were missing. While dental focal infection has always been recognized as having a direct relationship to some forms of asthma, [13] no such relationship occurs to our mind when we consider the other forms of allergy, especially that of the skin, migraine,[14] hay-fever, mucous colitis, etc. I feel that whatever the explanation may be, whether it be the endocrine,[15] or infections, etc., infected teeth are an important factor in this disease.

APPENDICITIS

The forty-nine patients constituting the group having appendicitis, who had more than 28 per cent of the teeth missing, were practically all suffering from the chronic type of the disease.

From clinical experience, I believe there is a definite relationship between focal infection and chronic appendicitis. No treatment is complete whether medical or surgical without thorough eradication of dental infection. The reason that the end-results of both medical and surgical treatment are so unsatisfactory in the chronic form[16] is that foci of infection are not completely eradicated, whether they be in the teeth or elsewhere.

13. Lintz, William: Bronchial Asthma, M. J. & Rec., 119: 287 (March 19) 1924.

14. Lintz, William: Study of Three Hundred Cases of Asthma and other Forms of Allergy, Ann. Clin. Med., 3:653 (April) 1925.

15. Lintz, William: Important Factors in Bronchial Asthma, Ann. Clin. Med., 2:286 (March) 1924.

16. Lintz, William: Appendicitis in 300 Cases of Asthma and Other Forms of Allergy, New York State J. Med., 25:368 (March 6) 1925.

TUBERCULOSIS

The thirty-four members of the tuberculosis group, who were practically all suffering from a pulmonary form of this disease, showed an average loss of 28 per cent of the teeth.

I believe that the relationship between infected teeth and tuberculosis becomes a vicious circle. The lowered resistence in tuberculosis, combined with poor oral hygiene, which is so frequently prevalent in these cases, makes the patient an easy prey for the various bacteria responsible for dental infection. These organisms, in turn, aggravate the tuberculosis mainly by toxic absorption, interference with mastication and secondary infection of the trachea and bronchial tubes. It would be interesting to determine in what percentage of cases bad teeth, by lowering the resistance of the individual, are a factor in the pathogenesis of tuberculosis. I know of no contraindication, but every indication for the therapeutic eradication of focal dental infection in this disease; a procedure feared by so many laymen and dentists.

TONSILLITIS

Seventeen patients in the tonsillitis group had lost more than 21 per cent of the teeth. It would be interesting to determine whether there is direct extension by way of the lymphatic or circulatory system from the teeth to the tonsils or vice versa. It is important, on account of its frequency, to bear dental focal infection in mind, when enucleating diseased tonsils for systemic disease. Machat[12] believes that unimpaired teeth are not infected by diseased tonsils. Many tonsillar infections clear up after the removal of maxillodental foci of infection.

ADHESIONS

At first glance, it is rather puzzling to explain why the fifteen patients in the group having adhesions should have lost 18.35 per cent of the teeth. But if we bear in mind that these adhesions are associated with gastric and duodenal ulcers, gallbladder disease[17] and appendicitis, both preoperative and postoperative, and that these diseases are associated with marked ravages of the teeth, the results are what we may expect.

BRONCHITIS

Nine patients having bronchitis lost 15.75 per cent of the teeth. I would not be at all surprised that here we have an etiologic relationship between infected teeth and bronchitis. These cases should be observed more closely in the future.

NONERUPTED TEETH

Nineteen patients in the group having nonerupted teeth had lost 15.75 per cent of their teeth. As endocrine stigmata[18] are a marked feature in our series of cases, especially thyroid and gonadal disturbance, whatever has been said under endocrines will apply here.

PYORRHEA

In six cases of pyorrhea, there was a loss of 12.5 of the teeth. The presence of this condition very well explains the loss.

RICKETS

In seven cases of rickets, there was a loss of 9.25 per cent of the teeth. Offhand, one would expect even a greater percentage in a disease associated with such marked calcium metabolism. But I presume this is offset by the age factor, as this is a disease of the young.

BACTERIOLOGY

The bacteria usually found in these dental foci of infection were mainly the various types of streptococci—viridans, hemolyticus, longus and brevis. *Staphylococcus pyogenes-aureus* and the pneumococcus were also found. Occasionally, the Freidländer, diphtheroid and influenza bacilli were present. I find autogenous vaccine immunization very efficacious in the treatment of the diseases above mentioned along with the therapy adopted for the disease in question.

COMMENT

It is a curious fact that about 15 per cent more teeth are lost in the upper than in the lower jaw. This holds good in health as well as in disease. To account for this, I believe various conditions operate. The alkaline glandular secretion of the mouth forms a reservoir in the lower buccal cavity, bathing and protecting the lower teeth continuously, by neutralizing the destructive acids. Furthermore, the vascular and nervous supply of the upper teeth is entirely different from that of the lower. The upper jaw is more cancellous, and is stationary, while the lower is movable.

It is interesting to note that both in health and in disease, the teeth are not lost haphazardly, but in a definite order. Numerically, this sequence is molars, bicuspids, central incisors, lateral incisors and cuspids.

The molars are the first to go, the cuspid, the last. This might possibly be explained on an atavistic and anthropologic basis. In the scale of human evolution, the carnivorous teeth were the first to develop. The herbivorous teeth developed at a much later period. We

17. Lintz, William: Cholecystography and Lyon-Meltzer Test in a Patient with a Congenitally Absent Gall-Bladder, Am. J. M. Sc., 173-682 (May) 1927.

18. Lintz, William: Unerupted Teeth, M. J. & Rec., 129: 670 (June 19) 1929.

know that those organs or structures which developed later in the evolution of man go earlier than those that developed in a more remote period. We therefore would expect the grinders, such as the molars and bicuspids, to be lost before the rest of the teeth. Another thing which operates here is the character and structure of these herbivorous teeth. They are full of corners, angles and grooves and are therefore more susceptible to retention of decaying material, followed by damage and infection. Can the striking, definite, orderly loss of teeth, as demonstrated in every one of the diseases mentioned above, as well as the preponderant dental loss in the upper jaw be explained on an endocrine basis? This would preclude an intimate relationship and control of the various endocrine glands and the various teeth.

Frequently, immediately after the extraction of a tooth, aggravation instead of amelioration of symptoms of the disease in question occurs. This is due to the superadded sensitization of the bacteria and their toxins, expressed in the circulation from the operative field. To avoid this, three or four injections of vaccine, prior to the dental extraction, made from the micro-organisms in question, will be sufficient to immunize the patient so that the extraction can be performed without harm.

The totals in all cases were as follows:

Males (108 cases): upper jaw, 385 teeth, or 22 per cent; lower jaw, 309 teeth, or 17 per cent; total, both jaws, 694 teeth, or 20 per cent.

Pregnant women (184 cases): upper jaw, 1,394 teeth, or 47 per cent; lower jaw, 1,224 teeth, or 44 per cent; total, both jaws, 2,618 teeth, or 44 per cent.

Nonpregnant women (sixty-nine cases): upper jaw, 161 teeth, or 14 per cent; lower jaw, 152 teeth, or 13 per cent; total, both jaws, 313 teeth, or 14 per cent.

Total females (253 cases): upper jaw, 1,555 teeth, or 38 per cent; lower jaw, 1,376 teeth, or 33 per cent; total, both jaws, 2,931 teeth, or 36 per cent.

Grand total (361 cases): upper jaw, 1,940 teeth, or 33 per cent; lower jaw, 1,685 teeth, or 29 per cent; total, both jaws, 3,625 teeth, or 31 per cent.

SUMMARY

Absence of teeth is indicative of disease of the teeth.

Patients suffering from diseases difficult to diagnose or to treat eventually become edentulous.

More teeth are lost in the upper than in the lower jaw; the molars are the first, the cuspids the last, to go.

The average office patient lost 31 per cent of his teeth. The teeth are not lost haphazardly, but in a definite order.

The way the teeth are lost in obesity forms another link in the chain of evidence of its relationship to diabetes.

The endocrines, through calcium metabolism, exert a definite influence on the loss of teeth.

There is an important relationship between general systemic disease and dental infection. The eradication of dental focal infection, with or without subsequent immunization with autogenous vaccine, very frequently constitutes the most important procedure in the treatment of the disease in question.

It is impossible to practice modern scientific medicine without the cooperation of the dentist. In many cases, the dental treatment is of more importance than the medical.

144 Joralemon Street.

CARCINOMA OF THE MOUTH*

By CASPER M. EPSTEIN, M.D., D.D.S., Chicago, Ill.

UNDENIABLY, carcinoma is becoming increasingly prevalent, and in line with this general increase, more and more instances of cancer of the oral cavity are met with. As these lesions present themselves in more than one aspect, a most careful clinical examination of all lesions appearing in the mouth is demanded, as therapy instituted in the very early stages of the disease offers some hope of recovery. During the past eight months, nine cases of malignancy of the mouth have come under my supervision, none, however, in the incipient stage. Two of the patients died shortly after I had first seen them. Chronic irritation seems to have been present in all but one case, which I am reporting here.

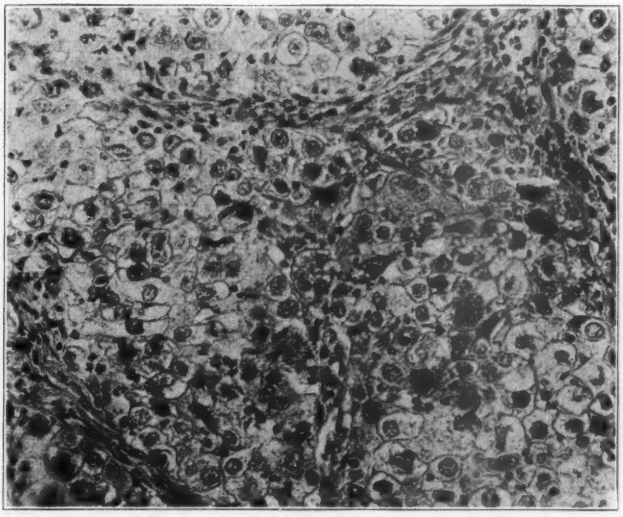

Fig. 1.—Squamous-cell carcinoma of gingiva. (High power magnification.)

It is interesting from several standpoints; first, the unusual metastasis; second, the definite demarcation with capsule formation of the metastatic growth; third, the difference in structure of the two masses, and, fourth, the fact that the tumor started after extraction of a tooth.

REPORT OF CASE

History.—W. M., a man, aged 48, had an upper left first molar extracted. The wound

*From the Oral Surgery Department of the Michael Reese Hospital.

never healed. Three weeks later, he came in with the complaint that he had a growth which felt like a boil in the area where the tooth had been extracted. The tooth was extracted because, he was told, there was a pus pocket at the end of the root. The growth bled on the slightest provocation. It was soft, but not tender. The patient had had headaches over the left eye for the past three or four days.

Physical Examination. — The patient was well nourished and well developed. He did not appear acutely ill and was not apparently in pain. The mucosa was moist and pink. The tongue was clean and there were no lesions. The upper left first molar had been extracted. In this area was a soft, angry looking red mass about the size of an almond. It bled very easily and extended up to the left maxillary buccal fold. The tonsils were large but not injected. The teeth were in fairly good condition. There were no overhanging restorations. A tentative diagnosis of carcinoma was made and the patient was admitted to hospital, Nov. 11, 1930. A section was taken for examination, the actual cautery being employed.

Treatment.—November 12, the mass was thoroughly coagulated with surgical diathermy under local anesthetic. The after-care consisted in the use of a sodium bicarbonate mouthwash with a Brophy syringe. A slough began to form on the day after operation, and there was some pain on the following two days.

Biopsy.—Section revealed a new growth of squamous cells which varied markedly in size, shape and staining qualities. The cells did not tend to assume a definite arrangement but appeared in masses and cords. Mitotic figures were numerous. In some portions, there was a beginning pearl formation. The surrounding tissue showed a considerable amount of hemorrhage, necrosis and infiltration by polymorphonuclear leukocytes, lymphocytes and endothelial cells. (Fig. 1.) The pathologic diagnosis was squamous cell carcinoma.

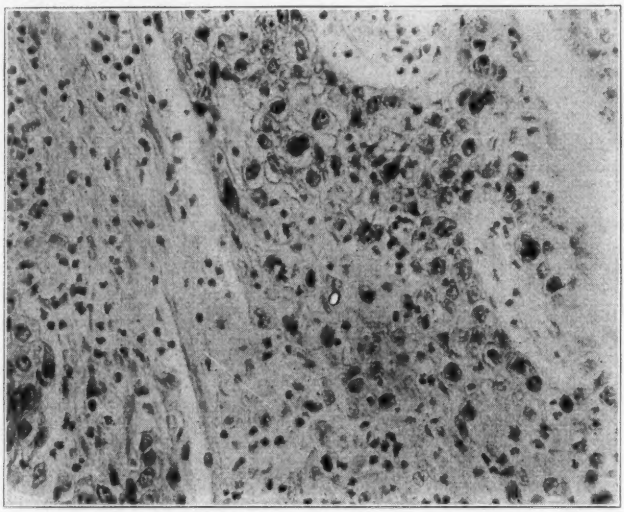

Fig. 2.—Carcinoma simplex of submaxillary gland. (High power magnification.)

Course. — About three weeks later, the patient entered the hospital with a tender swelling in the right submaxillary region. The swelling increased with the intake of food and between meals returned to its normal size. The carcinomatous growth had not increased in size and the coagulated tissues had sloughed away, but there were bleeding and tenderness over the left maxilla.

Physical Examination.—The swelling at its height was rounded, well demarcated, tender and about the size of a hen's egg. Intra-oral palpation revealed no stone in the duct of the submaxillary gland, although the history was typical of an obstruction. Lipiodol injection of the submaxillary duct and gland revealed nothing. Probing of the duct revealed an obstruction quite a distance back. As it was not thought advisable to operate intra-orally for the removal of this obstruction because of the amount of dissection that would be necessary in the face of the squamous-cell malignancy, an external incision was made in the shadow line of the left mandible and the tissues bluntly dissected away. The submaxillary gland was exposed, and lying over the duct at its entrance into the gland was a mass about the size of a hen's egg. It was

Fig. 3.—Spread of malignancy until teeth are hidden and mouth is filled with carcinomatous mass.

encapsulated and shelled out very easily. It was this mass that had caused the obstruction of Wharton's duct, with subsequent swelling of the gland.

Pathologic Report.—Gross: The specimen consisted of an encapsulated mass 4 by 3 cm. in the longest diameters. The capsule consisted of fibrous connective tissue. The mass was fairly firm, and cut with a moderate amount of resistance, revealing a yellow-gray cut surface in which were many red streaks.

Microscopic Examination: Section showed an extensive new growth of epithelial cells which varied markedly in size, shape and staining qualities. Mitotic figures were numerous. The tumor growth invaded extensively the original tissues, which could not be recognized. The tumor cells did not tend to assume any definite arrangement, but appeared in large masses and cords. Although it was not possible to precisely identify the type of cell from which the tumor arose, in some portions the cells closely resembled the squamous type. In a few portions, the center of a mass of tumor cells showed a slight amount of hyalinization. The tissue surrounding the tumor cells showed necrosis and infiltration by polymorphonuclear leukocytes, lymphocytes and endothelial cells. (Fig. 2.) The pathologic diagnosis was carcinoma simplex.

Outcome.—The malignancy spread very rapidly, until all the teeth on the left side were hidden from view by the tumor mass. Consequently, the patient was unable to eat. (Fig. 3.) To alleviate this condition as much as possible, the intra-oral mass was coagulated by means of surgical diathermy, and thus the teeth were brought in view and the patient was afforded a masticating surface. The swelling in the neck continued to enlarge until, at the time of death, it was about the size of a grapefruit.

COMMENT

As stated above, the metastasis of the original growth was unusual in that the mass found lying over the submaxillary gland was definitely malignant, and yet, contrary to all teachings in pathology, there was a definite capsule surrounding the growth and the basement membrane was intact. There were areas in the microscopic sections of the two growths, which were very similar to each other, and, on the other hand, there were other sections which were totally at variance. Another very interesting point to note is the site of the metastasis. Carcinoma of the upper jaw usually metastasizes to the internal maxillary and retropharyngeal lymph nodes, neither of which are palpable; whereas, malignant growths of the lower jaw show earliest involvement in the mental and submaxillary lymphatic glands. This is due to the anatomic distribution of the lymphatic system. The mere fact that we are not able to

palpate enlarged glands in the neck when there is a cancer of the upper jaw should not be mistaken for evidence that there is no metastatic involvement. Education of the public to seek advice whenever any kind of growth appears in the mouth and the sincere efforts of the diagnostician will help greatly to eradicate this most horrible disease.

55 East Washington Street.

SEVENTY-SEVEN YEARS AGO: AN INDICTMENT OF THE DENTAL PROFESSION*

By WILLIAM C. FISHER, D.D.S., New York City

IN the *New York Dental Recorder*, Asa Hill, of Norwalk, Conn., presented in April, May and June, 1854, a series of three editorials entitled, "What Shall Be Done to Preserve the Teeth of Children?" and, like the voice crying in the wilderness, there were few if any that gave heed thereunto. Yet we feel sure there must have been some, for the learned gentleman was permitted the following month to relinquish his editorship because of the adverse reaction to these very editorials. Mortal man, seventy-seven years ago, did not care to be shown his shortcomings any more than he does today.

With due allowance for the habits and customs of the day, one could, seventy-seven years later, quote these editorials and thus deliver a merited rebuke to the dental profession of 1931.

Dr. Hill said:

The fact is clear and admits of no disputation, that the teeth of our children are in a condition most deplorable—a condition demanding the utmost exertions on the part of our profession and the careful and earnest attention of physicians. When we see the temporary teeth of children crumble away and break down under the influence of caries, leaving nothing but black and unsightly fragments, with jagged edges standing out from the gums, and the gums themselves fretted, swollen, ulcerated and painful and all this before the first half of the period for which they were intended to serve them is past, we conclude that there is something radically defective somewhere. And yet, so common is this very thing, that neither the parents or medical advisors of these children give themselves any trouble about the matter, save perhaps, during occasional paroxysms of pain with which the child may be afflicted.

These marks of premature old age are scarcely to be found in any other circumstances connected with the development of the animal organism, and we find it extremely hard to reconcile ourselves to the idea that it must be so, in the instance before us.

He spends a greater part of his second editorial in trying to point out the particular duty of the dental and the medical profession in instructing the parent or guardian as to the dental health of the child. Herein, at that early date, he laid unusual emphasis on the opportunity of the medical practitioner, because of his advantageous contact, over that of the dentist. He states that the first occasion for the professional service of a dentist, as things usually go, is either the period of the eruption of the permanent teeth or a few years after, when they begin to break down and cause trouble.

*Read before the Massachusetts Dental Society, Boston, Mass., May 5, 1931.

He emphasized as strongly in those early days as we do now the importance of the watchful periodic supervision of the child during the eruption of the deciduous teeth and subsequently. The only disagreement we might have with the thought of those early days is the great stress that all the writers laid on the question of the duty of the physician in instructing the parent regarding the necessity of the early care of the child's teeth. It is at this point that I willingly lift that responsibility from the shoulders of the medical practitioner, if not entirely at least to a very great extent, and place it upon the shoulders of the dentist. It is the dentist who in his daily practice has been derelict in the duty of instructing the parent. If we were to ask, in any dental audience, how many general practitioners make it a rule always to inquire (particularly of new patients) if there are children in the family, and as to their age and if they have had dental inspection and care, I do not believe we would have a 2 per cent show of hands; and if we were a little more liberal with our question and asked how many occasionally did so, we still would have, if it was honestly answered, a very meager response in the affirmative.

ORAL HYGIENE

The question of oral hygiene impressed some of the leading minds seventy, eighty and even ninety years ago. We again quote from the same writer:

That which, perhaps, in ordinary cases is most practicable as well as beneficial, and which comes even within the scope of abject poverty is cleanliness—absolute cleanliness. Nothing in ordinary cases can supply its lack, as nothing will so effectually contribute to the preservation of the teeth as this simple thing. Water is free—a tooth brush costs but little, while the benefit is really incalculable. And the advantage of a habit, which every parent may contribute to form, can only be realized by those who are the subjects of a habit of cleaning their teeth every day of their lives.

We find in reviewing the literature on this most important subject the striking fact that, during the period of the Civil War, there was an unusual amount of discussion of this very problem. This is a remarkable fact, when one realizes that the country was torn in a war second to none found in modern history. Yet the contributions to this great cause of children's dentistry fell off so during the period of the recent World War that the contrast is more than noticeable. It is only within the past few years that a great revival of interest has been aroused in this subject by a few enthusiasts, encouraging philanthropists to build such monuments as you have here in your City of Boston. These great benefactions are meeting the necessity of the occasion, but in a small way. As an expression, they are excellent; but as to their far-reaching and complete benefit, we probably are expecting too much of them.

THE WHITE HOUSE CONFERENCE

The majority of you are doubtless familiar with the dental side of the recent White House Conference on Child Welfare, wherein it was proclaimed that among the many other things to which the child has unquestionable rights are not only sound teeth and a healthy mouth, but also frequent inspections and the proper preventive or restorative treatment that will keep the teeth sound and the mouth healthy, with all of the blessings that soundness and health can bestow.

CLINICS VS. PRIVATE PRACTICE

The children of the poorer class, or what may be termed clinical class, are receiving better service today than are the children in homes of more material

comfort. No one who has given this subject honest investigation will dispute that statement. It is the children from the families of the private practitioner that are not receiving proper attention. The fault cannot be laid entirely on any one class or division of society; the responsibility is a divided one.

Again, no one within our ranks will deny that the members of the dental profession themselves are not only better fitted to instruct the parents and guardians of the necessity of early and frequent attention to the teeth of their children, but, having so impressed them, they are also, or at least should be, the ones to render the service which they prove is a necessity. Perhaps it would be easier for us did the physician, in the very early years of the child's life, bring this lesson home to the young mother; for is it not the physician who feels the responsibility for the growth and health of the child, even from inception? And just as he directs the diet of the mother so that her unborn child may be given all the advantages of modern medicine and science, he could carry on after birth to insure the child a healthy babyhood, and so, when that ofttimes troublesome period of dentition begins, explain to the mother the necessity of the care of the child's teeth, first by herself, and later, as early as the third or fourth year, by the dentist.

CONFLICT WITH SCHOOL AUTHORITIES

If, during the preschool age, which is, as we all know, a very important period, we could persuade ourselves to render the services necessary, we would probably have much less work to do in the early school years. For here, during the early school years, we are confronted with the problem as to how the child in private practice may receive as efficient attention as the poorer child in the public clinic. It is the question of "time out of school hours." In those institutions where there is school dentistry, the child may have the necessary attention during school hours without any recorded loss of attendance, but if the parent desires the child to go to the family dentist, we are immediately confronted with opposition from the school authorities, the teacher, the principal and the superintendent. The parent is told that the necessary dentistry must be performed after school hours or on Saturdays; in other words, the child in the "private practice" family is punished by being made to give up its day of play, while the poor child or the clinic child has it free for recreation. If in order to save its only day of play in the week, the child is forced to go to the dentist after school hours, we are confronted with a condition that is equally responsible for the unsatisfactory situation existing today; namely, that dentists in the better class of practice do not desire children as patients, and are not able, even if willing, to give the best of services. What child after a long day in the classroom is in the nervous or physical condition to endure a half hour or an hour's session with the dentist? What dentist, after a full day of tedious office hours, is himself in as fine a condition to handle the most difficult of all of his clientele; namely, the nervous child, the tired child, the unwilling child. If the child is compelled to come in on Saturday, giving up its play, it frequently comes in a spirit of antagonism. This in itself is a handicap which the most expert specialists in this line of work find it frequently difficult to overcome entirely.

For the past eight or ten years, the dentists of the Pacific Coast interested in the dental problems of children have

waged a vigorous campaign against the school authorities, endeavoring to do so in a most constructive and friendly manner. James D. McCoy has been one of the most able leaders in this campaign, and his pen, as in the saying of old, has been "mightier than the sword." The editor of the *Pacific Dental Gazette* has been one of his most able allies. They did not hesitate to publish or broadcast conditions which were affecting the health of the children of today, the citizens of tomorrow. They pointed out that the children of school age were not being afforded the opportunity to have their dental defects remedied without unnecessary delay, and it seemed inconceivable and indeed beyond reasonable justification that the school authorities were not giving this work their wholehearted support. With that and similar unanswerable arguments, which it is unnecessary to detail at this time, the school authorities had to make concessions. Had they not done so, they would have had to admit, at the same moment, that they were incapable of the care of these children during the greater part of their young lives.

Dentists all over the country have been and still are confronted with the same problem, the same difficulties, namely, the lack of cooperation of school authorities. Why the children of taxpayers, the children of parents able and willing to provide the services of private practitioners should be denied the opportunities for this necessary work as are accorded to the children of the poor and the children of the public clinics is beyond comprehension. You may say that it is a far more difficult problem in the large cities, governing concessions made to a half million school children. I contend it is no more a problem than it is for a community in which there may be enrolled only a few hundred children. It can be solved in our smallest or our largest cities just as it was solved in the City of Los Angeles. All that each community needs is one or two able, but sincere crusaders, like Dr. McCoy and Dr. Endelman. I am convinced that the school authorities in practically every community can very soon be shown the necessity for hearty cooperation in this campaign toward the conservation of the health of the children.

INDIVIDUAL RESPONSIBILITY

Having convinced ourselves of the enormity of this problem of the care of the children's teeth, what hope have we that the children are to receive the necessary attention? What hope have we that having obtained the cooperation of school authorities, parents and guardians, the dentists will fulfil their duty? I have shown you that for nearly a hundred years, men here and there in our profession have pointed out the shameful condition of the children's teeth. Can we hope to convince and persuade the individual members of our profession that the solution of this problem rests with each and every licensed dentist?

Chalmers J. Lyons, of the University of Michigan, recently stated in an address that the dental profession was out of tune with the dental needs of the nation in that there are too few practices in which children are welcomed. He stated that, in the City of Detroit alone, there are more than 100,000 children who cannot receive dental care because there are not enough dentists who are willing to treat children.

One has a right to feel discouraged when one thinks that for so many years this sad neglect has been exposed, and yet in proportion to the advancement in our profession, in proportion to the won-

derful improvement in our facilities for our work, we are doing as little for the children as we did over seventy-seven years ago. Again, as early as 1863, a scathing denunciation of the practice of the day, was made in these words:

To the miserly skin-flint dentist, who rather than lose his fee of fifty cents, will pull a child's tooth two years too early, and thus entail upon the unhappy subject of his malpractice, pain and deformity, these lines will come most obnoxiously; but to him who, being a dentist, does not forget that he is also a man, and who does not cease to remember that to alleviate pain is the true destiny of his calling, and that his recompense therefor is only secondary, they will perhaps carry something of the intention with which they are written.

What would one think of a medical practitioner who neglected the children of his community? In many communities, they constitute more than three fourths of a physician's practice, and if our medical confrères hold the general run of dentists in contempt for their conduct toward the practice of children's dentistry, can we resent it, until we have at least made a sincere effort to meet our full responsibility and obligation to the public?

So many times do we hear an excuse based on economics given, and while it may be given honestly by a few, I believe that is merely a camouflage to excuse one's unwillingness to attempt difficult and often not too well appreciated work. The economic side of it must be dismissed immediately, for no man in general practice, particularly in our smaller communities, can build a better practice than by caring for children. They will be children but a short time, and in winning children as patients, you have won the parents of another generation.

I have called on the writings of the foremost men of our profession, going back over a period of seventy-seven years, to make this indictment of our profession. Unless we refute it by prompt and sincere effort to do our duty to the children of America, we may find ourselves "tried and found wanting," by a none too charitable public; and bear in mind that an aroused public has, and may again demand of its government, a solution of the problem that may be unfortunate and even disastrous to the dental profession.

In conclusion, listen with me to that wonderful physician poet, Solyman Brown, who over seventy-seven years ago, in the famous Canto Second of his poem, devoted to children's teeth, their care and treatment, wrote:

The first dentition asks our earliest care,
For oft, obstructed nature, laboring there,
Demands assistance of experienced art,
And seeks from science her appointed part.
Perhaps ere yet the infant tongue can tell
The seat of anguish that it knows too well,
Some struggling tooth, just bursting into day,
Obtuse and vigorous, urges on its way,
While inflammation, pain, and bitter cries,
And flooding tears, in sad succession rise.

Be prompt to act:—'tis dangerous to delay,
Since life awaits the issue of a day:—
Reject the gentler means:—employ the best:—
Let unobstructed nature do the rest.
This rule neglected, many a smiling form,
With beauty bright, and life blood glowing warm
Its parents' pride, a flowret in its bloom
Descends lamented to an early tomb.

Nor less the danger when the first array—
The infant teeth—alternately decay,
Or yield succession to a hardier race
With marked reluctance: for, in either case,
Neglect will bring repentance in its train;
In one, deformity, the other, pain
Or fell disease;—but timely care may still
Avoid the danger, or repair the ill.

Let azure eyes with coral lips unite,
And health's vermilion blend with snowy white;
Let auburn tresses float upon the gale,
And flowery garlands all their sweets exhale;
If once the lips in parting, should display
The teeth discolored or in disarray,
The spell dissolves, and beauty in despair
Beholds her fond pretensions melt in air.

THE IMPORTANCE OF OCCLUSAL COORDINATION IN BRIDGEWORK*

By LEE W. DOXTATER, D.D.S., New York City

MUCH has been said and written on the subject of traumatic occlusion as a factor in periodontal and dental diseases and quite as much has been said about the relief of this condition. A review of the literature dealing more or less directly with this condition, would, because of its voluminousness, seem to indicate that no further discussion was needed. That my contacts with both students and practitioners of dentistry have led me to believe that such is not the case, I attribute largely to the fact that the conception of traumatic occlusion as a pathogenic agency is of fairly recent origin.

While references to the need of "filing" or otherwise shortening loose teeth are found in early dental writings, little attention was paid to the grinding of teeth and equilibration of occlusion as a part of periodontal treatment until Stillman and McCall brought them into prominence. Since this development dates back only about fifteen years, we can readily see in this fact one reason for the present shortcomings of the profession as regards their understanding of this phase of treatment of dental pathologic conditions. Like other new ideas, the conception of the correction of traumatic occlusion in periodontal treatment has not made its way without opposition, and this also has held back the acceptance of the practice of occlusal equilibration as a preventive of periodontal disease.

If occlusal coordination and equilibrium are important factors in the health of teeth where none are missing and where, therefore, each tooth has only its own labor to perform, how much more important does this become where teeth are missing and the work of carrying their substitutes must be assumed by remaining natural teeth? Here, we have a direct burden beyond that which was natural for the teeth, and there arises at once the necessity of eliminating any overstress which can be avoided. This would seem to be an entirely logical premise even if we were not concerned over the possibility of the occurrence of traumatic occlusion in the full natural dentition. The facts are that much bridgework is being constructed today with little regard for and less understanding of the principles of occlusal coordination. Bridges are placed with facings which overlap the opposing teeth so closely as to produce extreme interference with lateral and protrusive excursions of the mandible. Abutment teeth which were already in traumatic occlusion because of excessive overbite or malposition are prepared for attachments with no attempt to relieve this condition. Furthermore, abutment inlays or crowns and also the occlusal surfaces of bridge pon-

*Read before the Michigan State Dental Society, Detroit, April 28, 1931.

tics are made overfull and are left appreciably higher than the other occlusal surfaces in the mouth.

As I survey this situation, I am convinced that the remedy, namely, occlusal coordination, must be administered in two well defined steps each differing in its nature from the other. The first phase of establishing occlusal coordination is the planning and construction of the piece so that the occluding surfaces will have the proper relationships to the surfaces opposing them in the various excursive movements of the mandible. The second phase is the final adjustment of these surfaces after the bridgework has been inserted. I make this distinction and wish to emphasize it because of the fact that there is a widespread belief in the profession that a prosthetic appliance which has been constructed with the aid of an articulator, especially an adaptable articulator, will have entirely adequate coordination simply because the occlusion was worked out on the articulator. A little thought will make it clear to anyone that there are several opportunities for error between the taking of the impression and the completion of the bridge, and even one error calls for correction after the bridge is completed. It may be well to mention, for one thing, the difficulty of reproducing mandibular movements with accuracy on the articulator, no matter what type of instrument is used. Other points might be mentioned as having a tendency to introduce error into the various steps of bridge construction, such as expansion or contraction of the various materials used. Sometimes, the resulting disbalance is perceptible to the naked eye, the need of adjustment in such cases being at once recognized. More dangerous and quite as common are the cases in which the bridge as inserted has every appearance of having complete occlusal harmony. In these cases, it is very easy for the operator to assume that no adjustments are needed after the bridge is in place. But the slight incoordinations which may quite as well occur in the latter group of cases as in the former have fully as great a potentiality for producing harmful results.

It will be clear from the foregoing that occlusion is to receive major consideration in the planning as well as the construction of the bridge. After it is determined that the proposed bridge is feasible from the standpoint of the health of the abutment teeth and the general condition of the mouth, a survey of the whole mouth, both roentgenographic and ocular, is made to detect the presence of traumatic occlusion. This study is made throughout the mouth. In other words, it is not limited to the region where the bridge is to be placed. The reason for this is that such an examination will often reveal conditions which may involve changing the plan for the bridge. Such change is sometimes found to be needed, for instance in cases of unusually close bite or extreme overbite. The tissues are inspected to determine the presence of changes of form or color which might indicate the existence of traumatic occlusion. The roentgenograms are also studied with the same thought. Particular attention should be paid to the expression of incipient disease, not only because this is so readily overlooked, but also because if it is present, it points to the need for an especially careful equilibration of occlusion in a proposed bridge case. Occlusal inharmonies which may be tolerated over a long period of years when there are no artificial teeth in the mouth often induce a rapid development of periodontal disease as soon as bridgework or other restorations are inserted.

Strange as it may seem, this may even come about in other parts of the mouth than the area in which the bridge is placed. Needless to say, occlusal incoordination involving the bridge abutments or the opposing teeth leads rapidly to disaster.

After the survey to determine the presence of traumatic occlusion, the next step is its correction. This includes also the additional procedure which is implied in the title of this paper. It is often difficult to determine, in the absence of clinical signs, that traumatic occlusion is present. Yet experience in the correction of this condition indicates that certain occlusal relations have in them the potentiality for harm. The dentist, because of the fact that he is about to place an artificial structure in his patient's mouth, must anticipate as far as is possible the development of symptoms from potentially harmful occlusal relations. The man who proposes to undertake this work may well begin by studying the accepted standards of occlusion as worked out by the full denture prosthetists. These men have perforce learned how to plan occlusal relations so that their dentures will cause the least tissue disturbance through interference in the various mandibular movements. It is a well known fact that full dentures which are not in good occlusal balance almost invariably cause ridge resorption because of the uneven distribution of stresses. The absorption of bone around teeth which are in traumatic occlusion is a somewhat analogous process.

In studying the occlusion of a proposed bridge case, attention is first given to the overbite of the anterior teeth. Excessive overbite of these teeth may develop either as a result of malposition of the teeth themselves, because of which the upper and lower incisors erupt beyond their natural occlusal level, or because of wear or absence of teeth in the posterior part of the mouth, with resulting so-called closure of the bite. In either case, there is an extreme overlapping of the anterior teeth with resultant overstress in both protrusive and lateral mandibular movements. Cases are often seen in which this condition prevails and in which the damage to the periodontal structure is relatively slight when the mouth is first examined. Such a condition invariably tends to tissue damage, and when bridgework is to be inserted, this damage should be anticipated as far as possible before the case is started.

The first step is the shortening of upper or lower teeth, or perhaps both, to reduce the extent of the overbite. The decision as to which teeth are to be ground is made on the basis of the relative length of the anterior teeth as compared with the posterior teeth of the same jaw. In the larger number of cases, it will be found that the lower anterior teeth stand perceptibly higher than the lower posterior teeth. In such a case, the lower anterior teeth are the ones to be shortened. Similar cases will be found with regard to the upper teeth, and it is a fairly common occurrence to find the upper central incisors noticeably longer than any of the other upper teeth. During the time that the anterior teeth are being shortened, they are kept under observation as to the contacts of the upper and lower teeth with each other, with the idea that, in protrusive occlusion, the maximum obtainable number of teeth shall occlude with each other. The number will vary according to the curvature of the arch and the position of the teeth in the arch. It is highly desirable that the six lower anterior teeth make con-

tact with the four upper incisors, at the very least, in the protrusive position.

Wherever possible without undue sacrifice of tooth structure, the anterior teeth should be shortened sufficiently to bring some of the posterior teeth into contact when the anterior teeth are brought edge to edge. This provides for a still greater distribution of stress during incising movements.

After the maximum degree of protrusive equilibration in the protrusive occlusion has been obtained, attention is given to the relations of the posterior teeth. These teeth are first studied as to the anatomic design of their occlusal surfaces. Teeth which have prominent and sharply pointed cusps because of the close interlocking which goes with this conformation produce a greater amount of interference in lateral movement than do those of less pronounced contours. In the case of teeth with long pointed cusps, it is always wise to modify the shape of these cusps so that the upper and lower teeth may glide over each other with less tendency to produce a rocking of the occluding teeth in their sockets. Attention is also to be given to areas of wear which may have resulted in an accentuation of cusp height and corresponding interlocking. Cases are often seen in which the buccal cusps of the upper bicuspids and molars have worn in such a way that they overlap the buccal surfaces of the lower teeth half way to the gum line. The interference with lateral movements which results puts a tremendous strain on the periodontal tissues of these teeth. Such cusps should be shortened and, in addition, the cusp guidance, especially of the upper teeth, should be modified by changing the inclination of the guiding surfaces. It is usually best to modify the upper teeth first, and after they have been given the desired occlusal form, the lower teeth are modified to harmonize with the uppers. "Harmony" here is intended to convey the thought of a harmonizing of form and also of occlusal pressure in the various excursive movements of the mandible. In other words, there should be developed an equilibrium of stress which will insure that the work of each tooth is in proportion to the strength of its supporting tissue.

This latter point is most important, and it is a difficult thing to determine when this equilibrium has been obtained. It is not sufficient to decide this question on the basis of carbon paper markings. This method was formerly considered satisfactory for the grinding in of full dentures because of the fact that the teeth were held in rigid relationship with each other by the denture base; but, even in this field, it is not considered entirely reliable at the present day. With natural teeth, we are dealing with units each of which is suspended in its socket by resilient tissue. The give of this tissue varies for the different teeth, and hence even less dependence can be placed on carbon paper markings as an index of equilibrium.

By placing the tips of the fingers on two or three adjacent teeth and instructing the patient to close and make various movements of the mandible, the variation in stress can be readily determined through the sense of touch. The information thus gained serves as a guide as to which teeth need further grinding. Another index of overstress which is helpful as a guide in grinding is the slight blanching of the marginal gingivae when the teeth are brought into contact. Another guide which is usually reliable is the patient's own sensation of stress. This aid should always be invoked, particularly as a sensation of unequal stress,

if allowed to persist, may be a source of considerable annoyance and actual discomfort. Every possible means which may assist in developing a high degree of occlusal equilibration should be utilized; for unless this is done, injury, if not discomfort, will be liable to follow.

The best attainable state of occlusal equilibrium and freedom from undue interference having been produced, the actual construction of the bridge may be undertaken. The thought of the operator is now turned toward the construction of a bridge the occlusal function of which as determined by its design shall harmonize with the occlusal of the other teeth in the mouth. If it is a posterior restoration, attention should be given first to the conformation of the occlusal surfaces. Long pointed cusps should be avoided for the same reason that dictated the modification of similar cusps in the natural teeth. The bridge units should, of course, be worked out with the aid of an adaptable articulator to insure harmonious action through both natural and artificial occluding surfaces.

When facings are used, either anteriorly or posteriorly, their length and occlusal relationship to the opposing teeth must be so planned that they shall not cause interference with protrusive and lateral movements of the mandible. This is a common point of error in bridgework, and, for that matter, in partial and full denture restorations. The supposed demands of esthetics often lead the dentist to make facings for bridge pontics of a length which inevitably causes excessive interference because of extreme overbite. Such difficulties should be anticipated in the preliminary survey of the case and the need for dangerous length should be eliminated by the shortening of the natural teeth, which has already been described.

As a check on the correctness of the occlusion which is being worked out on the articulator, the bridge should be tried in the mouth several times during the construction of its various parts. This should begin with the abutment structures, whether inlays or crowns, and as each new unit is developed, it should be tried in the mouth and the occlusion verified in all mandibular positions before it is perpetuated in metal. After completion, it is again checked for occlusion, and minor discrepancies, which are very likely to be found in spite of the previous checks, are given a final correction.

It is unwise to assume, even after taking the precautions which have been mentioned, that the occlusion is in the state of harmony desired. It is a difficult matter for the patient to produce all the natural movements of the mandible under the artificial conditions obtaining in the dental chair. It is therefore highly desirable to have the patient return after the bridge has been in the mouth for about two weeks. Shiny spots on the gold or areas of attrition on the porcelain will show those points which are striking. If these are found in locations which point to interference or overstress, they should be ground and the patient dismissed for another period of observation if this is considered necessary.

It may seem strange to some that such great insistence should be placed here on the equilibration of occlusion in bridgework. While much might be written about the technic of bridge construction, it is well to draw attention to the fact that innumerable bridges in which a high degree of technical excellence has been achieved have failed. And the reason that they have failed is that, in spite of

correct mechanics in structure, they have violated the laws of occlusion and have thus been the direct cause of periodontal disease of the teeth acting as bridge abutments and of the opposing teeth. A bridge, like a chain, is only as strong as its weakest link, and occlusion is a link which has frequently given way and brought about the destruction of an otherwise well executed restoration.

SOME NEW VIEWS ON DENTAL DISEASE*

By WILLIAM G. DOWNS, JR., D.D.S., M.A., Ph.D., New Haven, Conn.

WHILE for many centuries whatever of dentistry there was was done by the people who were practicing medicine or surgery or their equivalents, and the one branch was inseparable from the other, with the beginning of dentistry as a separate profession in this country, approximately 100 years ago, a new situation began to be apparent. From that time until this, dentistry has been viewed as something separate and apart from medicine and the biologic sciences. It is only within the past few years that any real effort has been made to bring it back into the family of medical sciences.

Now, it becomes apparent that pathology of the mouth can not in any sense be separated from pathology in general. The fundamental tissues are essentially the same and the same biologic processes apply to the development, growth and metabolism of these tissues. The same tissue fluids furnish nutriment to these cells as to cells elsewhere in the body, and they are susceptible to the deleterious effects of the same toxins.

Changes in curriculums, substitution of academic degrees, erection of buildings and changes in licensing laws can do little to inject such a comprehensive view into dental philosophy. Only the acceptance of these fundamental facts by teachers and practitioners can bring about such understanding. Fact is fact, wherever expounded.

With this in mind, we may begin our study of dental disease with the assurance that an understanding of general biologic processes is necessary, as is the case with any other part of the body. We may likewise feel sure that those influences which are damaging to dental or mouth tissues will likewise be injurious to the tissues of the body in general. While in a sense this complicates the study of dental disease, in another sense it simplifies it, because it means that the underlying phenomena and laws are those of medical science and are the result of centuries of trial and error, analysis and experimentation.

While medicine as such has long since given up the idea of a philosopher's stone which would give one a simple clue to the cause of a disease, such has not been the case with dentistry. It has been assumed that there is *a* cause for dental caries,

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and that when that cause was found, the understanding and treatment of decay would be a simple matter. It was felt likewise that there was *a* cause for periodontal disease, and that when that cause was discovered, the treatment and cure of periodontal disease would almost resolve itself. Viewed in the light of our understanding of disease processes in general, this attitude now seems almost ridiculous, and is certainly obsolescent if not obsolete.

I can say unhesitatingly that such is not the case and that no single cause will ever be found for either of these great dental diseases.

Each of them is due to a blending, in different proportions, of numerous complex conditions, which may be roughly grouped into four categories:

1. Congenital conditions, including those the outgrowth of heredity *per se* and those the result of variations in intrauterine conditions.

2. What I choose to call metabolic condition, being the metabolic state of the individual at any given time, influenced as it is by his diet and total nutritional intake.

3. Traumatic, physical and similar conditions.

4. A great group, generally classified under infection, including immunity, susceptibility and sensitization.

Approaching the subject from this angle, it is difficult to understand why there should be the wide discrepancy found in the attitude of various research workers and groups. Certain groups have found a high degree of correlation between nutritional deficiencies and the dental diseases and have given us to understand that these diseases were the direct outgrowth of such deficiencies. In other groups, in which the bacteriologic approach has been utilized, the feeling has been very strong that infection was of primary etiologic importance. Still others, who have approached dental disease from the hereditary angle, have found a great body of evidence for the influence of hereditary conditions on these diseases; while a few, working on periodontal disease, have felt that so-called traumatic occlusion, or mechanical damage, was *the* cause of this condition.

Undoubtedly, each of these groups is a factor in the etiology of any given case of either type of disease, and one must understand this fact thoroughly in approaching the handling of such disturbances.

In my own earlier studies, as well as in those of others, ample evidence was submitted regarding the importance of hereditary factors in the spacing, form and texture of the teeth and the form and regularity of the jaws and investing structures. In a later series of studies, it was demonstrated that while it was difficult in a specific case to correlate a particular mouth disease with a single type of endocrine disturbance, caries in particular, and periodontal disease to a somewhat lesser degree, were found to be much more frequent among individuals suffering from endocrine disturbances despite the most scrupulous kind of dental and dietary care. Our later studies at necropsy have further borne out this idea, with respect to individuals in later age groups.

For the past three years, I have had underway a quite comprehensive study of the effects of various metabolic states on the development, growth and condition of the teeth and their investing structure, and I can say with great definiteness that this influence is an important one. Variations in the endocrine state and variations in diet affect the rate of growth, texture and incidence of disease in the develop-

ment of teeth and adnexa. We have not in my own group made any comprehensive study of the traumatic and physical factors. Adequate work in this direction has been done in other laboratories evidencing the striking importance of these features.

I feel that the most important statements which may be made are in connection with the old bone of contention, focal infection. I know that the concept which I formerly had of focal infection, its importance and its mechanism, was that organisms themselves were transmitted from the focus around the tooth socket or in the tonsil or wherever the primary focus might be, to some other specific part of the body, there to establish additional, similar foci of identical organisms. I believe that this is essentially the concept which most men still have of these infections.

In the past two years, our work, both experimental and at necropsy, has given us a somewhat new concept of the importance of foci of infection. It is not my intention in this paper to cite experimental evidence and illustrations, as I think they are frequently boring to a clinical audience, and one who is sufficiently interested may follow through my line of thought and basic data in the literature, either already published or in the process of publication. Following are the conclusions that I feel may be drawn, tentatively at least, from these studies to date.

In correlating a large series of necropsy studies from our laboratory, it became obvious that there is a high degree of correlation between periodontal disease and the cardiovascular diseases. Practically every case into which the anatomic diagnosis of "central" or "peripheral" arteriosclerosis, sclerotic changes in the kidney, or the peripheral sclerosis of diabetes could be written shows an almost parallel destruction of the pericemental membrane and periodontium. Histologically, sclerosis of the minor vessels in this region is a constant picture.

This line of reasoning was accepted as a working hypothesis and further followed until from postmortem and clinical findings I am convinced that one of the most common causes of periodontal disease lies in changes in the capillary network supplying these tissues. So often has this been seen that I am today convinced that frequently the earliest observable symptom of these vascular changes is the breaking down of these constantly traumatized tissues, and that the impending systemic change may be early diagnosed in this way.

Periodontal "disease" is not an entity but a condition which may be brought about in varying degrees and in many ways. Not the least of these, and basic perhaps to the most stubborn cases, is a change in the vascular walls.

At the time that a periapical infection may be revealed by the roentgen rays, its most important stage has long since been passed. When one sees the large, well-circumscribed, clear-cut periapical area, so common in dental roentgenograms, the histopathologic picture which accompanies it is such as to lead one to believe that this lesion is largely scar tissue and that whatever organisms may in fact be present are pretty well walled off from the remainder of the tissues of the body. Not so with the earlier dental lesions, capable also of experimental production and ranging all the way from severe pulpitis to the earlier stages of the periapical lesion, not demonstrable by roentgenogram. Here, we have excellent evidence that while the organisms involved are almost always of low virulence, they play a major rôle in sensitizing the individual

to both their own toxins and those of other organisms which may later gain entrance.

Further, organisms from such mouth foci seldom, if ever, localize in a perfectly healthy distant organ. It is not until this organ has been weakened by vascular changes of some other type, such as arteriosclerosis, or it has had its metabolic state altered by these sensitizing toxins, that it becomes the site of such a secondary focus. I recognize that the term "sensitization" or "allergy" is becoming a popular one for all conditions which cannot otherwise be placed, but I am convinced that the most important rôle which periapical infection can play in the production of disease lies in the sensitizing influence which they urge on the tissues of the body at large.

All these facts are, of course, of primary importance to the research worker or the pathologist, but what, one may ask, is their importance to the man in the clinical practice of medicine or dentistry? To me, the answer seems obvious. The methods of diagnosis, understanding and treatment of dental disease must closely parallel those already in general use in medicine and surgery, which presupposes familiarity with such methods.

If we intend to recognize lesions before the roentgen rays may logically come to our aid, we must make use of a rather wide armamentarium of methods of diagnosis. For this reason, the temperature of a person with a suspected pulpitis or other early dental lesion is of just as vital importance to the dentist as it would be to the physician trying to determine some obscure disease condition. The blood count, hemoglobin content, etc., over a period of days are likewise of great importance. The response to sensitization tests, changes in plasma makeup and nonprotein nitrogen and variations in blood pressure and heart rate are all of primary importance in understanding such conditions.

Further, if we admit these premises, the methods of treatment must be likewise in line with accepted medical and surgical procedures. In a vast number of cases, mere extraction of an involved tooth is not sufficient to eradicate a suspected or sure focus. Frequently, curettage, as it has generally been utilized in the past, is contraindicated. A careful flushing out and draining of such a socket is usually much wiser. If curettage may be utilized, it should be carefully and wisely done.

Our necropsy studies have indicated that few if any root-canal fillings are ever a means of entirely eliminating or preventing foci of infection. Careful root-canal filling in conjunction with surgical extirpation of an infected apex and the subsequent encouragement of healthy sterile, bone growth in this region, is acceptable from both the dental and the surgical standpoint.

Frequently, an extraction, in particular of an impacted third molar, becomes a major operation just as dangerous and requiring just as great skill as a major operation elsewhere. When this is true, it should be carefully surrounded by all of the surgical safeguards applicable to other types of operation. No man would think of removing a gallbladder without a thorough knowledge of his patient, and without every conceivable safeguard. Yet equally serious operations are constantly performed in the mouth without any such safeguards, and, more frequently than one realizes, the direct or indirect results may be seen on the necropsy table.

CONCLUSION

I wish to reiterate that dental disease is in no sense different in its processes or mechanism from disease elsewhere in the

body, and that a thorough understanding of the fundamentals of these processes and familiarity with the technics involved are a positive essential for the understanding of these facts and of the problems involved. Cooperation must be obtained between dentists and physicians, and mutual acceptance of each of the other's methods and point of view must be secured.

ORAL VINCENT'S INFECTION—A GENERAL SURVEY OF DIAGNOSIS AND TREATMENT*

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WE shall endeavor to here present practical ideas concerning the handling of oral spirochetosis. The dermatologist is frequently called on to diagnose and treat ulcerative stomatitis. It is, therefore, important that he have a comprehensive knowledge of Vincent's infection and, even though the Vincent organisms be demonstrated, be able to differentiate this from such conditions as pemphigus, aphthous stomatitis, drug eruptions and other conditions which occasionally cause ulceration of the oral mucosa.

The early diagnosis of Vincent's infection, with the proper use of intensive and judicious treatment, is necessary for the permanent eradication of the disease and for the prevention of its serious and often fatal complications.

Vincent's infection may be defined as an infectious ulceromembranous and sometimes gangrenous disease. While it is seen most frequently in the mouth and throat, it may also involve any of the other organs of the body. It is caused by the Vincent symbiosis of a large spirillum and a fusiform bacillus. The Committee on Nomenclature of the American Dental Association, in 1923, adopted the term Vincent's infection when the condition affected the oral tissues, suggesting that the term Vincent's angina was more applicable when there was involvement of the tonsils, uvula and pharynx.

Miller[1] (1883) observed the presence of spirochetes in the mouth, apparently identical with *Treponema macrodentium* (Noguchi) and *Spirochaeta vincenti,* associated with a comma bacillus, which was subsequently identified as *Vibrio proteus.* Vincent[2] (1899) was the first to describe the fusiform bacillus as a normal inhabitant of the mouth. He found the organism present in the dental tartar of 78 per cent of the normal subjects examined. Pratt, in her series, found them present normally in small numbers in the throats of 100 per cent of human beings examined. Kline[3] quotes

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1. Miller, W. D.: Micro-Organisms of Mouth, Philadelphia: S. S. White Dental Mfg. Co., 1890, p .80.

2. Vincent, M. H.: Ann. Inst. Pasteur, 13:609, 1899.

3. Kline, B. S.: Relation of Oral Spirochetosis to Pulmonary Gangrene, J. A. D. A., 16:64 (Jan.) 1928.

the observations of H. Steuer, who found the Miller-Vincent organisms present in 372 mouths showing various grades of hygiene. He was able to demonstrate the organisms in the interproximal spaces of the vast majority of mouths considered grade A, that is, mouths showing no disease and no artificial restorations. There is still disagreement concerning the frequency of the occurrence of Vincent's organisms in normal mouths. Stitt,[4] in his textbook on bacteriology, makes the statement, that the Vincent organisms are rarely seen in mouths free of pathologic changes. The various observers agree that the disease is definitely increasing in frequency. It is difficult to say whether there is an actual increase or only an apparent one due to the more frequent recognition of the disease.

Considerable work has been done to determine which of the two organisms plays the principal rôle in the production of this condition. Plaut, in 1894, was convinced that a fusospirochetal symbiosis was the cause, but he could not decide which organism was responsible for the pathologic action. Two years later, Vincent considered the fusiform bacillus as the primary agent and the spirochete as a simple saprophyte. Following Ehrlich's discovery of the spirochetocidal value of the arsenicals in the treatment of syphilis, Kurt-Bludhorm demonstrated the curative effect of arsphenamin on Vincent lesions. As a result of this therapeutic test, he, and many others, concluded that the spirochete was the causative factor. Most observers now are not in accord with this view. When arsenicals are used, the spirochetes are destroyed. With the disappearance of the spirochetal factor, there is no longer any symbiosis, and the fusiform bacillus becomes inactive, a clinical cure resulting. A similar cure can be obtained by attacking and destroying the fusiform bacilli, with a resulting inactivation of the spirochetes. Therefore, the disease is caused by the two organisms, neither one alone being the causative agent. The fusospirochetal organisms are probably saprophytic, but acquire pathogenic activity when the normal resistance of the tissues is reduced as a result of toxic, bacterial or mechanical factors.

Bacteriologic studies of Vincent lesions reveal a predominance of the Vincent spirochetes, fusiform bacilli and the comma bacilli or vibrios. Many other gram-negative and gram-positive organisms may also be present. The spirochetes and fusiform bacilli are strictly anaerobic, while the vibrios and the other organisms are aerobic. It is the opinion of many investigators that the aerobic organisms consume the oxygen in the regional tissues, producing a local anaerobic condition suitable for the growth of the fusospirochetal organisms.

Microscopic studies of tissues from Vincent lesions show two definite zones. The first is called the zone of necrosis, which contains many of the aerobic organisms in the superficial layer and large numbers of fusiform bacilli in the innermost layer. The second or inflammatory zone consists of innumerable spirochetes, but no fusiform bacilli or pus-producing organisms.

The question of immunity in Vincent's infection is interesting because it so closely simulates syphilis and other spirochetal diseases. One attack of the fusospirochetal disease does not give protection against subsequent attacks. Sufficient antibodies may be produced to hold the infection latent for some time, but a definite immunity, as developed in many

4. Stitt, E. R.: Practical Bacteriology, Blood Work and Animal Parasitology, Ed. 7, Philadelphia: P. Blakiston's Son & Co., p. 547.

of the bacterial infections, does not occur in this disease.

The Vincent organisms are responsible for a variety of symptoms which vary with the degree and extent of the infection. In the early and mild cases, the gums are slightly swollen and spongy and there is a definite marginal hyperemia. As the infection progresses, the gingivae become more inflamed and painful, especially in the interproximal spaces. Slight pressure causes bleeding. The interseptal tissues stand away from the teeth, which causes the latter to become loosened and painful to touch and on mastication. The inflammatory process may extend deeper into the tissues involving the pericementum. In this stage, the patients have the sensation that the teeth are being pushed out of the sockets, causing the teeth to feel more prominent. The Vincent lesions may be single or multiple, beginning as small irregular, ill-defined inflammatory macules or papules. The commonest site is in the region of the molars, especially in the space between the first and second molars. The center of the lesion becomes covered with a whitish or grayish pulplike exudate, due to the superficial necrosis of the mucous membrane. This slough, or exudate, containing the characteristic Vincent organism, is quite easily removed, exposing a superficial ulcerated surface, the edges of which are clearly defined, but not indurated. Surrounding the ulcer is a definite hyperemic area. In the severe cases, there is a marked *fetor ex ore,* characteristic of spirochetal infections, described as a peculiarly penetrating foul acrid odor. In some patients, there may be a heavily coated and painful tongue, with dysphagia and a constant drooling of saliva. The Vincent organisms are often responsible for such symptoms as ear ache, pains in the mandibular joints and neurologic pains in the side of the head or face. The sublingual and submaxillary glands which drain the affected areas may become swollen and tender in the more severe cases. The temperature may become elevated and the pulse more rapid, and the patients may suffer from sleeplessness, general malaise and mental depression.

The diagnosis of Vincent's infection is readily made by bacteriologic examination. The material to be examined is collected with toothpick applicators and smears are made on glass slides. The organisms are stained with anilin gentian violet and are easily recognized. Wet preparations may be examined with the dark-field microscope. By means of the latter method, the Vincent spirochete is found to be a motile, somewhat irregular spiral body, from 10 to 30 microns in length and about 0.5 micron in thickness. Also, the fusiform bacillus is demonstrated to be a nonmotile, straight, spindle-shaped organism, thickest in the center and tapering at the ends.

Kline has been able to produce pleuropulmonary gangrene in rabbits after the intrabronchial injection of material from Vincent lesions. It is well known that such material, when injected into the groins of guinea-pigs, will produce gangrenous sloughs or fusospirochetal abscesses.

There is an important factor to be constantly considered in the diagnosis of Vincent's infection. Any destructive lesion in the mouth, regardless of the etiology, not only causes a diminution in the resistance of the tissue, but also offers an excellent medium for the growth of the Vincent organisms. These organisms are often abundant in the necrotic tissue of epitheliomas, lymphomas and gummas of the oral cavity. The organisms may also be found in association with mouth

lesions of tuberculosis, diphtheria, herpes, leukoplakia, pemphigus, erythema multiforme, mercurial stomatitis and various burns. In these cases, even though the Vincent organisms are secondary invaders, the treatment should be directed at them, since the elimination of the Vincent infection has a favorable influence on the primary condition. The demonstration of the Vincent organisms in such conditions should not lead the dentist to overlook the possibilities of other conditions. One of us recently saw a case of pemphigus in a girl, aged 19, who consulted her dentist because of a sore mouth. Vincent organisms were demonstrated in smears from the lesions, and for two months the patient was treated for "trench mouth," with slight improvement. The diagnosis of pemphigus was made when the characteristic bullous skin lesions appeared. The patient died soon afterwards. As it is impossible at times, without detailed study and close observation of the patient, to conclude definitely that Vincent's infection is the sole underlying cause of the condition, the latter diagnosis must always be made, with some reserve.

The literature abounds with various remedies for the treatment of this disease. Mangabiera-Albernaz,[5] in a recent report, gave five requisites for a remedy to be efficacious in the treatment of Vincent's infection. These requirements are so important that we quote them:

1. The remedy employed should be absorbed to a greater or lesser extent by the tissue, that is, it should penetrate in order that its action be felt upon the deeper tissues and on the surface.

2. It should be antiseptically active for an appreciable time. This means that the remedy should not be immediately resolved by contact with the tissue, as happens, for example, with hydrogen peroxide, perborate of sodium, etc.

3. It should be neither caustic nor destructive. These qualities unfortunately are often and universally made use of in the treatment of the disease. If we destroy tissue we increase and enrich the field for the multiplication of germs, for unless the cauterization be very extensive, the germs present not only on the surface, but in the deep tissues will not be reached.

4. It should have a dissolvent action upon the necrotic tissue characteristic of the lesion.

5. Its antiseptic action should be specific upon one or other components of the symbiosis, for if one of these is eliminated the symbiosis is destroyed.

Mangabiera-Albernaz found that bismuth fulfilled all of the foregoing requisites, and in his hands this drug has proved to be an excellent agent in the treatment of Vincent's infection. In comparing it to arsphenamin, he concluded that bismuth is less toxic, more powerful, more economic and more sedative, and allays the characteristic pain almost immediately. He painted the lesions daily with a 30 per cent emulsion of bismuth tartrate. Patients were advised to gargle with a mild antiseptic every two to three hours. Three days' treatment was usually sufficient in most of his cases.

Brownell[6] advised a local spray with 5 per cent neo-arsphenamin in 20 per cent glucose, followed in a few minutes by an application of 5 per cent solution of copper sulphate in glycerin. This was then neutralized by spraying with hydrogen peroxid.

Frank[7] advocates removing the membraneous coating from the lesion and painting the raw surface with ordinary tincture of iodin, which acts against the fusiform bacilli. This is followed by a thorough swabbing with solution of potas-

5. Mangabiera-Albernaz, P.: Laryngoscope, 39:1-15 (Jan.) 1929.

6. Brownell, L. G.: Pac. Dent. Gaz., 38: 515 (Aug.) 1930.

7. Frank, P.: Laryngoscope, 39:831 (Dec.) 1929.

sium arsenate (Fowler's), which is directed against the spirochete. In addition, he gives this solution by mouth, 10 drops three times a day. Under this treatment, his ordinary cases clear up in from three to four days. He believes that it is unnecessary to employ strong arsenical preparations, such as arsphenamin, since the spirochete succumbs readily enough to weak arsenical applications.

Williams,[8] who is of the same opinion, has recently reported a case in which neo-arsphenamin, in the ordinary antisyphilitic doses, was unable to prevent the development of Vincent's infection in a patient who had not previously suffered from the disease. He believes that the ordinary case of Vincent's infection does not warrant the use of arsphenamin, because of its relative danger and expense, until other accepted remedies are given a fair trial.

In our experience, the following procedure has been successful. The lesions are painted daily with a 30 per cent emulsion of bismuth tartrate. The patient is then instructed to use an aromatized perborate mouth wash every hour during the day. The perborate mixture may be obtained already prepared, or the prescription for a more bland mixture, as advocated by Box,[9] can be supplied. These patients are usually clinically cured in from five to seven days. If the improvement is rather slow, the arsenicals are used locally and internally. A 5 per cent solution of neoarsphenamin in 20 per cent glucose is applied to the lesions. Internally, the patient takes 10 drops of solution of potassium arsenate by mouth three times a day for five days. In addition, he is given a few intravenous injections of neo-arsphenamin. When the acute lesions have subsided, the patients are discharged, but are instructed to continue the sodium perborate mouth wash or to use an antiseptic tooth paste for several weeks. Otherwise, there will be a recurrence of the infection. As a prophylactic measure, all bad dentures, infected teeth and enlarged tonsils should be given attention. Recurrences are the rule unless a complete eradication of the infection has been accomplished.

The prophylactic treatment of this condition is very important. The infectious nature of the disease, with the possibilities of direct transmission by kissing, sneezing and coughing and indirect transmission by means of toothbrushes, drinking cups and eating utensils must be explained to the patient. The dentist must carefully sterilize all instruments used in treating these cases. In order to minimize the danger of aspirating Vincent organisms, definite prophylactic measures should be carried out in all patients before operations in the oral cavity and before any general anesthesia is administered. Such a program of preoperative oral care is now being carried out at the Mount Sinai Hospital in Cleveland, with excellent results.

The seriousness of this condition is demonstrated by the many possible complications that may follow oral Vincent's infection. Many cases of pleuropulmonary gangrene following oral spirochetosis have been reported by Kline and Smith. Chevalier Jackson reported two cases of ulcerative bronchitis due to an extension from oral lesions. It is not uncommon to encounter fusospirochetal disease of the ears as demonstrated by Barenberg.[10]

8. Williams, G. A.: Arch. Derm. and Syph., 20:322 (Sept.) 1929.

9. Box, H. K., in Dyment, M. L.: Oral Health, 10:548 (Oct.) 1930.

10. Barenberg, L. H.: J. A. M. A., 94: 1065-1067 (April 5) 1930.

The organisms may be conveyed into the ears through the external auditory meatus by means of contaminated fingers or ear syringes or other foreign bodies. They also may find entrance through the eustachian tubes as a result of aspiration or of migration from the nasopharynx. The organisms may be encountered in the sinuses, where they grow very rapidly because of, first, a loss of the ciliary action of the epithelial cells and a diminution of the bactericidal action of the secretions due to the chronic inflammatory reaction in the sinuses, and secondly, a shutting off of the circulation of air with the establishment of anaerobic conditions. Seecof[11] reported a case in which death occurred as a result of extension of the infection from the accessory nasal sinuses. In this patient, there was a fusospirochetal meningitis resulting from the extension of the infection from the sinuses through the diploe of the frontal bone. Fuller and Cottrell[12] reported infection in a finger which had been bitten by a person suffering from fusospirochetal stomatitis.

Feldman,[13] in his "Manual of Exodontia," stresses the seriousness of removing teeth in patients with Vincent's infection. The gums of these patients should rarely, if ever, be punctured. The injection of procain hydrochlorid or other local anesthetic offers absorbing surfaces for the bacteria already in the mouth. Too many instances are now on record of serious conditions following extraction of teeth in infected mouths.

CONCLUSIONS

1. The simple Vincent lesion which is often overlooked by the physician and dentist may develop into a serious affection.

2. The early diagnosis of this disease, followed by judicious and intensive treatment, is necessary for its complete eradication.

3. The patient should continue home treatment for several months or longer after all signs of the infection have gone as a prophylactic measure against recurrences.

11. Seecof, D. P.: Arch. Otolaryngol., 10: 384-397 (Oct.) 1929.

12. Fuller, C. R., and Cottrell, K. C.: J. A. M. A., 92:2017 (June 15) 1929.

13. Feldman, M. H.: Manual of Exodontia, Philadelphia: Lea & Febiger, 1926, p. 166.

VULCANITE CHEEK-PLATES IN THE TREATMENT OF HABITUAL CHEEK BITING AND CHEEK SUCKING: REPORT OF A CASE OF LICHEN PLANUS OF THE BUCCAL MUCOSA

By F. van MINDEN, D.D.S., Chicago, Ill.

NOW and then, we see patients who, for some reason, habitually bite the cheek, the habit sometimes resulting in injuries of the buccal mucosa. Such cases are usually treated by grinding and polishing the buccal cusps and margins of the bicuspids and molars in the upper and lower jaws and instructing the patient to endeavor to break the habit. As a rule, this treatment will be

found successful, as the patient finds it impossible to grasp and bite the cheeks between teeth the cusps of which have been ground off sufficiently.

Recently, a case of persistent cheek sucking, without biting, came under my observation. As the cheeks can be sucked between the teeth, no matter how much the latter may have been ground off, it was apparent that the usual treatment would be of no avail. After searching the dental literature and not finding much light on the subject,[1] I was compelled to develop a method. It is, I believe, new and has proved very effective so far.

By placing two accurately fitted plates of vulcanite between the buccal surfaces of the jaws and the mucosa of the cheeks, one on each side of the mouth, a very persistent habit, which might have led to serious consequences, has been successfully arrested. (Fig. 1.) For lack of a better name, I have called these appliances "cheek-plates"; which I believe correctly explains their function.

In the hope of contributing in a small way to the solution of similar cases in other hands, I am recording here a detailed history of an unusual case of lichen planus of the buccal mucosa accompanying cheek sucking and a description of the technic employed in constructing the cheek-plates.

1. The Index of Periodical Dental Literature (Black) has no heading for cheek biting and cheek sucking. Under "Habits as causes of dental irregularities," articles can be found with special reference to orthodontia and malformations of face and jaws. Of these published during the last ten years, the Librarian of the American Dental Association reported none under the title of cheek biting or cheek sucking. A few make only very incidental mention of these habits, and without offering any remedy or cure. Among these are: Pullen, H. A.: Abnormal Habits in Relation to Malocclusion and Facial Deformity, Internat. J. Orthodon., 13:233 (March) 1927. McCoy, J. D.: Applied Orthodontia, Philadelphia: Lea & Febiger, 1931, p. 100. Tishler, Benjamin: Occlusion Habit Neurosis, Dent. Cosmos, 70:690 (July) 1928.

REPORT OF CASE

Clinical History.—A married woman in the early thirties had been under my care for a number of years and had received very regular and careful dental attention. She had a normal posterior occlusion, but an anterior cross-bite and all her teeth were present. Numerous inlays and porcelain jacket crowns had been employed to restore the bicuspids and molars. The buccal overlap was not unusual and there were no rough and irritating cusps, margins or protrusions.

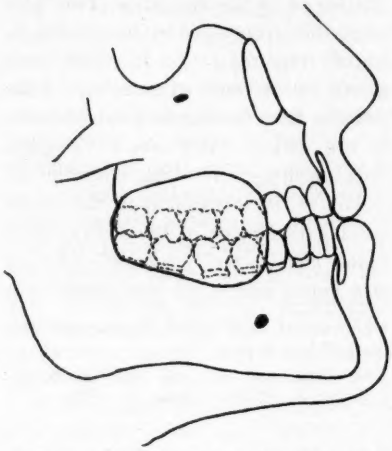

Fig. 1.—Sideview of cheek-plate in position in vestibulum oris.

The patient always was in an extremely nervous condition and, about four years ago, this evidenced itself, among various other symptoms, in the form of a continuous gritting and chewing on the posterior teeth, accompanied by cheek biting, more pronounced on the right side than on the left. These habits proved very stubborn and only occurred at night while the patient was asleep. The gritting and chewing became so severe, notwithstanding many attempts on the patient's part to stop it, that in effect it caused a traumatic occlusion, leaving the teeth lame and painful on pressure, especially on awakening in the morning.

The usual treatment was instituted and the buccal cusps and margins of the upper and lower posterior teeth on both sides were properly rounded off and the high spots removed and the enamel thereupon was carefully polished smooth again. As a result, the mucosa of the cheeks, which had been injured considerably, clearly showing the raw imprints of continued biting, healed promptly. Mental relaxation was suggested to overcome the nervousness and the case appeared cured.

The cheek-biting habit unfortunately persisted owing to the continued nervous condition of the patient, which found its main outlet during her sleep, and it became necessary to grind and polish the posterior teeth again, which was done, with apparently good results. By this time, it was impossible for the patient to continue biting the cheeks as the buccal cusps of the posterior teeth were out of occlusion while articulating. At any event, the patient reported no further trouble from this source for several years.

At about the same time of the first cheek biting, she began to suffer from a serious case of lichen planus, which attacked various parts of the body, principally the skin of the extremities. (Lichen planus is an inflammatory dermatosis in which are displayed multiple, flat-topped angular or polygonal papules, often exhibiting a color containing various shades of crimson or purple, the plane apex of each being usually flat or depressed and covered with a horny film.—Ormsby.[2]) She was put under the care of one of the foremost dermatologists of the city, who declared the lichen planus to be of nervous origin and treated it by means of a series of injections, local applications, irradiation, etc. The skin condition yielded so satisfactorily to this treatment that the patient discontinued it too early, thinking the case cured. Unfortunately, she suffered several relapses, due to her continued nervousness. Treatment by the same dermatologist was reinstated at every recurrence and good results were obtained.

The patient returned to me in February of this year for her regular dental prophylactic treatment. On examination of the mucosa of the cheek, it appeared at once that she had developed a condition far worse than she had ever had before. The appearance of the mucosa opposite the interdental space was one of a maze of rather wide streaks and lines, running criss-cross, of a grayish white hue, interspersed with areas of dark red tissue. There was no bleeding and no open wounds could be noticed, but the mucosa looked very angry. Although the imprint of the teeth was discernible, the mucosa was smooth to the touch and not raw as in cheek biting. The gums and the other mucous membranes of the mouth were normal. The patient admitted that while she had not bitten her cheeks anymore, she had developed a new habit, that of cheek sucking while asleep, and seemingly could not stop. it. As her mouth had been somewhat painful from this sucking, she had been aware that something was wrong, but had not realized its seriousness.

Diagnosis.—Owing to its similar appearance, the possibility of leukoplakia, with the attendant danger of subsequent malignancy, first came to my mind. On reexamination by the same dermatologist, the condition was diagnosed as lichen planus of the mucosa of the cheeks, probably aggravated by the trauma and irritation from continued cheek sucking. In consultation, the advantage of eliminating this cheek sucking as a source of local irritation was pointed out to the dermatologist and recognized by him.

It should be noted here that the appearance of lichen planus of the mucous membrane of the mouth (cheek, palate, tongue and lip) is quite different from that of lichen planus of the skin. A few quotations will illustrate this.

Andrews[3] describes lichen planus of the mouth as consisting of "milky-white papules, the size of a pinhead or smaller which form annular or linear patterns, or appear as discrete puncta, or, more commonly, aggregations of them form irregular patches, which have a reticulated appearance."

Lieberthal[4] gives a most minute dedescription. He states that lichen planus of the mucosa of the cheek has the appearance of papules, oval or circular plaques, streaks or linear projections with

2. Ormsby, O. S.: Diseases of Skin, Philadelphia: Lea & Febiger, Ed. 3, 1931, p. 298.

3. Andrews, G. C.: Diseases of Skin, Philadelphia: W. B. Saunders Co., 1930, p. 463.

4. Lieberthal, D.: Lichen Planus of Oral Mucosa, J.A.M.A., 48:559 (Feb. 16) 1907.

intervening furrows. The tissue is glossy and has parallel, convergent or divergent lines, which cross each other and form a network, stellar or brushlike formations. The lines are sharply defined and are painless. As the case gets older, the roughness disappears, there are no more elevations and the tissue becomes so flat that only shiny white discolorations remain, easily confused with leukoplakia, which look as if the tissue had been cauterized with silver nitrate.[5]

It is interesting to observe at this juncture that, as far as I have been able to ascertain, not a single case of, or original article on, lichen planus of the mouth has been directly reported in the entire American dental literature. The Index of the Dental Periodical Literature (Black) from 1839 to 1927 (as far as published) and the Quarterly Cumulative Index Medicus from 1920 to March, 1931, reveal the remarkable fact that reports of lichen planus of the mouth have been made only in foreign journals, chiefly by British and French dermatologists. Such references as can be found in the American dental literature consist merely of short abstracts of a few of these foreign articles and only the incidental mention of lichen planus of the mouth in a few American articles, written on other related subjects.

Of these foreign articles,[6] the contri-

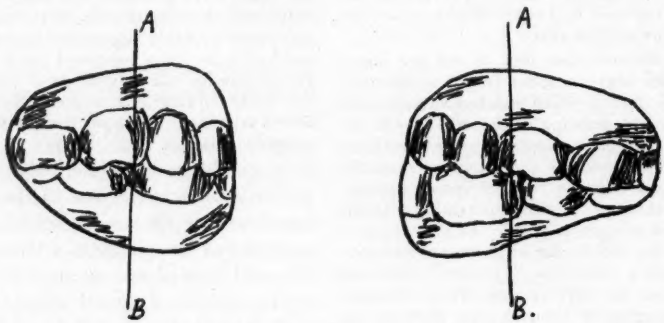

Fig. 2.—Left and right cheek-plates, showing surfaces facing teeth. (Actual size.)

5. Several textbooks on oral surgery and diseases of the mouth make only brief reference to lichen planus of the mouth; viz., Mead, Brown and Blair. The book of Moorehead and Dewey, "Pathology of the Mouth," p. 225, goes somewhat more into detail.

6. Brocq, A. J. L.: Lichen Planus of Mucosa and Leukoplakia, Presse méd., 27:277 (May 22) 1919; abstr. Dent. Cosmos, 61:905 (Oct.) 1919, and Dent. Rec., 39:470, 1919, 40:51 (Jan. 1), 119 (Feb. 2) 1920. Gray, A. M. H.: Lichen Planus: Report of Case, Proc. Roy. Soc. Med. (Derm. Sec.); abstr. Dent. Surgeon, 21:147 (March 8) 1924. Samuel, H. C.: Lichen Planus Confined to Mouth, Proc. Roy. Soc. Med., February, 1925; abstr. Dent. Cosmos, 67:1241 (Dec.) 1925. Engman, M. F.: Oral Focal Infection in Relation to Skin Diseases, Dent. Cosmos, 68-676 (July) 1926. Thiebierge, G.: Lichen Planus of Buccal Mucosa, Rev. de Stomatol., 25:2 (Feb.) 1923; abstr. Internat. J. Orthodon., 9:400 (May) 1923. Crouzon, O., and Bouttier: Pigmentation and Lichen Planus in Mouth as Signs of Suprarenal Insufficiency, Bull. et mém. Soc. méd. d. hôp. de Paris, 44:67 (Jan.) 1920. Montgomery, D. W., and Culver, G. D.: Lichen Planus of Mouth Alone, Brit. J. Dermat., 41:456 (Feb.) 1929. Fernet, P.: Buccal Lichen Planus, Paris med., 1:59 (Jan. 18) 1930. Prinz, Hermann: Leukoplakia Oris, a Clinical Study, Dent. Cosmos, 70:663 (July) 1928.

bution of A. J. Louis Brocq, "Lichen Planus of the Mucosa and Leukoplakia," is one of the most pertinent, because in it he gives a detailed differential diagnosis between leukoplakia and lichen planus of the mouth. (The subject of differential diagnosis is also covered in the article of Lieberthal[4] and that of Hermann Prinz.[6]) He reports three cases of lichen planus, the most interesting of which was that of a man, aged 35, who had lichen planus of the cheek, which was not relieved until the molars that had kept the tissues injured had all been extracted!

Samuel reports one case, on the hard palate. Engman says: "Lichen planus causes white spots, psoriasis also. You may term these leukoplakias."(!) Prinz presents an excellent article on a related

Fig. 3.—Cross-section through line *A-B* of cheek-plate shown in Figure 2.

subject, which makes a brief reference to lichen planus in the differential diagnosis of leukoplakia (p. 807).

ETIOLOGY

Although the etiology of lichen planus is not entirely certain, most authorities agree that two factors generally stand out: nervousness and trauma. Ormsby[2] mentions nervous exhaustion, grief, anxiety, overwork, mental strain and also digestive disturbances and diabetes as factors, and he particularly notes the development of skin lichen planus along traumatic lesions such as scratch lines and scars from bites by dogs, ants, etc.

Chipman[7] observes that the disease may result from systemic toxemia or bacteremia, originating often in the teeth.

Lieberthal[4] notes that elimination of irritation from sharp substances and proper mouth hygiene have a favorable effect in the cure of lichen planus of the oral mucosa.

It seems plausible to presume, therefore, that the local manifestation of this disease was probably aggravated by the trauma and irritation from continued cheek sucking as a contributing factor. In consultation, the advantage of eliminating this sucking as a source of local irritation was pointed out to the dermatologist and recognized by him.

It remains to be seen how much and how often this condition may account for other similar cases. The fact that most dermatologic authors do not mention the teeth and biting or sucking of the cheek as causative factors (except Lieberthal[4] and Brocq[6]) and the absence of any observations of lichen planus of the mouth from strictly dental sources is significant in this respect.

TREATMENT

The problem was now to find a simple method to prevent the cheeks from being sucked between the teeth. The fact that all the teeth were present and in a state of complete restoration made the use of appliances depending on attachments to restorations in individual teeth or to some form of bridge or splint impractical. Moreover, the peculiar conditions under which the patient would have to use the appliance precluded anything which was in the least complicated or bothersome to insert or fasten.

Because she sucked the cheeks only while asleep, the appliance was needed

7. Chipman, E. D.: J.A.M.A., 71:1276 (Oct. 19) 1918.

only at night. Furthermore, it should be so constructed that it could be inserted quickly and without trouble, especially when the patient was tired and ready to retire. For this reason, the use of ligatures, wires, clasps and other attachments, which might have been utilized under more favorable circumstances, was contraindicated. Not wishing to destroy dental restorations already completed and in perfect condition, I was puzzled what to do.

In view of the use of bite-plates, principally in the anterior part of the mouth, and for other purposes usually, the possibility of their application in this case was seriously considered. This would have meant the construction of an appliance of vulcanite, into which the upper and lower teeth would fit when closed, with flanges on the buccal and lingual sides for proper retention. To do this bilaterally brought up the problem of managing the anterior teeth. If both sides were connected and the appliance continued around the front teeth and the mouth was thus kept closed, the accumulation of the saliva, which would be bound to occur, and the fact that the saliva would have to be swallowed, would surely make the patient very uncomfortable, and would possibly prevent sleep and tend to aggravate her nervousness.

If both sides were left separate, the bite would be opened (to the extent of the thickness of the occlusal part of the bite-plate) and permit the saliva to drool out of the mouth during sleep, a condition which would not be desirable. Moreover, one large appliance, or even two smaller ones, might easily irritate more than they would benefit the patient. For these reasons, I refrained from using such bite-plates.

The next idea considered was to modify this bite-plate by eliminating the lingual flange with its irritation to the tongue, and the consequent salivation. Instead, the buccal flange could be extended farther up and down, using the occlusal part for retention. This still was not a satisfactory solution, because of the resultant opening of the bite and the unpleasant drooling of the saliva.

Finally, it occurred to me to eliminate this difficulty by leaving off the entire occlusal part of the bite-plates. At first, I questioned the practicability of this, because of the danger of swallowing the appliance and the possibility of its sagging and cutting into the lower buccal fold. On further reflection, it became clear that it should be possible to construct cheek-plates sufficiently large to prevent their being swallowed and also promote their retention in the mouth, and that, in the absence of any downward force acting on the plates, the danger of sagging or cutting into the lower mucosa could not be great. I therefore decided to try this method with the cooperation of the patient.

Technic.—As no modus operandi existed, one had to be developed. A flat cake of thoroughly softened modeling compound was inserted in one side of the mouth between the cheek and the buccal surfaces of both jaws and the surplus compound trimmed off. The patient was instructed to close the mouth and make all normal facial movements. Through this process of muscle trimming and an application of hand pressure to the cheek, a sharp impression of the buccal surfaces of the upper and lower jaws and teeth was obtained, extending to the upper and lower buccal folds. The impression was carried slightly beyond the third molars, but as far as possible, to increase the retention, and the modeling compound was trimmed anteriorly at the cuspid region, as much being left as the shape of the mouth would permit. Sufficient thickness for adequate strength, without too much bulk, was added on the buccal side. A smooth and

gently curving buccal surface was thus provided.

The same process was followed on the other side and the impressions were tried in together to determine whether they could be worn with comfort. When found satisfactory, they were marked left and right, invested and vulcanized in maroon rubber in one flask and highly polished, especially on the buccal sides (Figs. 2-3).

Insertion.—The placing was very simple as the cheek-plates required but little trimming or adjusting. The fact that the gingival side of the cheek-plates fitted against the buccal surfaces of both jaws was largely instrumental in their retention, for the identations of the buccal surfaces of the teeth fitted accurately against them and prevented dislodging. The slight extension around the third molars helped similarly.

As the cheek-plates were needed only at night, the patient was taught how to insert them, which she learned to do in a few seconds, and was instructed as to how to avoid displacing them with the tongue or otherwise. When out of the mouth, they were to be kept in a glass of cold water, containing a mild antiseptic.

RESULTS

I did not see the patient again for six months, when she returned for regular prophylactic treatment. It was very gratifying to observe that the mucosa of both cheeks had returned to a nearly normal condition. The lichen planus had disappeared almost entirely. There were only a few narrow spots left and these were negligible as compared with the condition before the treatment.

The patient reported that a few weeks of steady use of the cheek-plates at night had completely broken her of the habit of cheek sucking. She had been able to leave them out thereafter and since then had needed them only very occasionally. There had been no discomfort at all. The plates had been retained remarkably well, especially considering her extreme nervousness. There had been no salivation, sagging, swelling nor pain of any kind. Better yet, the area of lichen planus, relieved from further local irritation and trauma, had yielded nicely to the renewed dermatologic treatment and had almost disappeared.

PROGNOSIS

The prognosis is very good. The temporary use of the cheek-plates seems quite sufficient to stop even a very persistent case and the possibility of any recurrence of the habit is not great. If the habit returns the patient can again wear the cheek-plates as long as needed.

CONCLUSIONS

With this limited experience, the following conclusions are ventured, although with due reservations for possible future modifications based upon further study.

1. In cases of habitual cheek biting or cheek sucking, when the grinding of the buccal cusps of the posterior teeth does not correct the condition, the use of cheek-plates is indicated.
2. Cheek-plates, constructed as here described, can be successfully retained without any attachments to the teeth, even in the mouth of very nervous patients, and while asleep.
3. If made sufficiently large, there is no danger of their being swallowed.
4. Cheek-plates do not interfere with the occlusion, nor with dental restorations already present.
5. They do not open the bite and cause no salivation.
6. They can be instantly inserted by the patient, without any effort or help from others, and with less trouble than other appliances.
7. They are not very difficult to construct.
8. Cheek-plates retain their usefulness and can be used again in the event of a recurrence of the habit.

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LEUKOPLAKIA

By G. F. LOGAN, B.S., D.D.S., Philadelphia, Pa.

"REGULARLY up a tree," is a phrase from Thackeray's "Vanity Fair." Who has not been up the metaphorical tree, and far out on a weak branch? Four years ago, I was hanging to a weak branch, and I could find nothing that remotely resembled a ladder in the dental literature, even when the tree was classified. H. K. Seelaus, clinical chief at Jefferson Hospital, came to my rescue.

I have deferred this report until I could say that, after the three successive attacks reported here, the case is under control. I cannot say more than that. There has been scarcely any indication of a recurrence of the first two conditions for over two years, but in the third, in which pneumococci were found, recurrence seems to be always imminent, and only persistent vigilance prevents it.

For years, my wife had the pernicious habit of biting her cheeks while talking when eating. In December, 1927, she complained that there seemed to be something "stringy" along her right cheek that she could not avoid biting every time she ate. I looked into her mouth and saw that the cheek had almost chalk-white, cordlike lines from the second molar (the third molars have not erupted) to the corner of the mouth. The lines stood out like cords. I was baffled. I consulted Dr. Seelaus, who immediately pronounced the trouble leukoplakia, and added that it was usually premalignant.

In an effort to find out something about leukoplakia, I went through my dental and medical books. I found a sentence or two in Bödecker and Burchard. They mention it in connection with syphilis, showing how little the writers knew about it. Stengel's "Pathology" refers to it under "catarrhal stomatitis." Stevens has a paragraph. I looked through the libraries of two physician friends, but found little on the subject. In a large bookstore, I found a very discouraging paragraph. Surgical intervention was, the writer stated, usually necessary. Later, I visited one of the largest, if not the largest, dental libraries in the world. Leukoplakia was not indexed. The following year, Hermann Prinz published a complete treatise on leukoplakia.

My wife was 48 years old. She had no organic trouble, and she had always enjoyed good health, but she had very little reserve. One tooth only had been extracted. The rest were in good condition. The roentgen rays revealed nothing abnormal. There was an unusually short cap on the right second molar. The crown of the tooth was so short and so sensitive that I was unable to grind away enough to accommodate solder in the cap. A hole wore through the top. There was absolutely no irritation at the gingival margins of the cap. The cement filled the space where the hole had worn through. There were no spaces for deposits to lodge. The teeth

were typically pyorrheal, with some absorption of gum tissue and loose margins.

Dr. Seelaus recommended the use of a potassium chlorate prescription four times daily, and painting with acriflavin between times. To prevent biting of the cheek, I used a thin wax plaque, which had to be kept in position while eating. I tried a thin vulcanite wafer clasped to a molar, but it irritated. At night, she was most comfortable with a thin layer of cotton wool saturated with an alkaline antiseptic solution.

In about two weeks, the trouble extended to the tongue and left cheek. At this time, there appeared on the left cheek a violent inflammation, resembling Vincent's infection. Sodium perborate soon eliminated that. The inflammation occurred at intervals afterwards, but always responded to the sodium perborate. It was probably due to lack of efficient prophylaxis as the whole mouth was excessively sensitive. Any irritation, even stretching the mouth sufficiently to examine it, was followed by a greatly aggravated condition.

While at the shore the following year, a chill, while bathing, precipitated violent inflammation of a new variety. The area was quite pink and preceded by blisters, involving all the oral cavity. We naturally tried the perborate. It aggravated the trouble, and eating was very difficult. When Dr. Seelaus saw the reaction to the perborate, he suggested a culture, which revealed a pneumococcic infection. He then prescribed 5 per cent quinin, which dispelled that and succeeding attacks. Since that time, each chill is followed by pneumococcic infection. The attacks are preceded by what the patient describes as "a very acid taste," then the blisters, next the pink inflammatory area, which, up to last January, ran a course of several weeks. Since then, there has been but one attack and that of short duration. The gums look so much healthier now than they have since the onset that I believe, under ordinary circumstances, there will be no recurrence.

The pneumococcic infection centered over the second molar crown. There were a succession of violent incursions that suggested a focus of incubation. I suspected the cement in the cap, but I was not sufficiently sure to risk the aggravation my experience indicated would follow the irritation necessary for removal of the cap.

Two years ago, conditions seemed propitious, and the cap was removed. There has been no recurrence on that side of the mouth since. I repeat that there was no gingival irritation, so the cement must have been the medium.

The infection since then has been on the left side, where there were some cement fillings on account of hypersensitiveness of the teeth. I removed them and I also extracted a suspected tooth. The infection occurred over the second molar on that side. It stands alone and the gum tissue is quite loose around it. I once found quite a deposit under the distal margin. Of the many preventive agents tried, hydrogen peroxid is the best.

Recently, at Dr. Seelaus' suggestion, iodin vapor was used, and there was almost immediate improvement in the gums. I am now trying it on all inflammatory oral tissues and in root canals.

THE INVERTED CUSP TOOTH*

By RUPERT E. HALL, D.D.S., Chicago, Ill.

THIS paper deals with occlusion in a new, simple and practical manner free of theories and complicated procedures. It shows the way and the means for making more efficient, more comfortable and more nearly permanent dentures, understandable to any dentist and applicable to the practice of all.

After many years' experience as a practitioner of dentistry, the greater part of which has been devoted to the specialty of denture prosthesis, it appeared evident to me that the subject, with special reference to occlusion, was enshrouded in much confusion and with many impractical procedures; that, in fact, the dentist was not the master of the subject, but the subject the master of the dentist.

In a consideration of occlusion as based on the so-called "modern" ideas and procedures, results are, on the whole, unsatisfactory and disappointing. The dentures are not efficient nor comfortable, and they are not so nearly permanent as is desirable and possible of attainment.

By the time the modern denture can be made comfortable, the supporting tissues will have become atrophied, which permits relational changes between the dentures, and the whole machine is thrown out of gear. The once beautifully occluded, balanced, interlocking cusps no longer retain their finely perfected relations. The case is now a failure, and we must rebase or remake it, to find that the process merely repeats itself, with the end result that the patient loses his once well formed, efficient jaw ridges, and is thenceforth a dental cripple for life.

Who could be happy in a business—for, indeed, dentistry has a business side—delivering to an unsuspecting and trusting public a service so unsatisfactory?

How much better it would be to be able to make a set of dentures for a patient that would be efficient and comfortable, and would be reasonably permanent and would preserve the jaw ridges.

The conventional cusp teeth, with their occlusal relations, because of the interlocked cusps, predetermined and restricted to these relations, are a failure since they do not provide reciprocal accommodation to compensate for discrepancies arising in their making and for relational changes that occur between the dentures because of atrophy of the supporting tissues, and settling and shifting of the dentures. Furthermore, the cusp tooth is not efficient because the extent and direction of force required to make it so dislodges the dentures and traumatizes the supporting tissues.

The secret of the success in eliminating the difficulties enumerated lay in improving on the form of tooth employed in denture prosthesis. With this thought,

*Read before the Section on Full Dentures at the Midwinter Clinic of the Chicago Dental Society, Jan. 14, 1930.

the inverted cusp tooth was conceived and designed.

As it is not possible to anchor artificial teeth as natural teeth are anchored in the alveoli of the jaws to resist the required forces necessary to effect efficient mastication, it is desirable to provide a form of tooth mechanically suited to the requirements of the conditions to which it is to be adapted and under which it is to function.

There are two points to be considered in the designing of such a tooth:

1. The cutting, grinding and triturating surfaces of the teeth should effect efficient mastication with the minimum amount of muscular force, and direct the forces of mastication favorably to the retention and stabilization of the denture.

2. The occlusion of the teeth should be reciprocal to compensate for the inevitable relational changes that always occur between the dentures from tissue atrophy and change of jaw relations.

The inverted cusp tooth fulfils the foregoing requirements.

The scope of adaptability of the inverted cusp tooth is without limit. It is equally applicable to all types of cases. It serves in the difficult case in a manner heretofore unequaled, and if used in the more favorable case, it naturally will function even better, and will insure against the case becoming an "unfavorable" one.

The inverted cusp tooth is not a tooth for the select, difficult case alone, but a tooth for any case—a mechanical tooth for artificial use under artificial conditions.

SOME OF THE POINTS OF ADVANTAGE IN INVERTED CUSP TEETH

1. Inverted cusp teeth are easier to set up than cusp teeth.

2. In the use of inverted cusp teeth, the arrangement (form of occlusion) is optional. There is no restricted predetermined occlusal interdigitation required between the upper and lower teeth as called for with inverted cusp teeth. They may be set lingually or bucally (regular or crossbite), distally or mesially (orthognathic or prognathic case), without consideration of definite interdigital occlusal relation. The teeth of both the upper and the lower jaw can be set over the ridges, and leverages are thus minimized.

3. In the use of inverted cusp teeth, increased tongue room is afforded because more cases can be set in crossbite relation.

4. Grinding in the occlusion of the inverted cusp teeth improves their masticating efficiency rather than destroys it as is the case with cusp teeth. Extra material is added in the manufacture of inverted cusp teeth for the purpose of allowing for adjustment of the occlusion.

5. Dentures made with inverted cusp teeth are more efficient and require less pressure to effect mastication because of the relatively small occlusal areal contacts and the sharp scissor-like action of the peripheral edges.

6. Dentures made with inverted cusp teeth function without cusp interference. Tipping and rocking of the dentures is therefore minimized, and trauma, soreness and tissue change are likewise minimized, with the result that the dentures are more comfortable and the duration of service of the dentures is increased. This eliminates much of the need for rebasing and the construction of new dentures, which is necessary with the use of interlocked cusp teeth.

7. In the use of inverted cusp teeth, relations between the dentures are permitted to change (reciprocal or compensating occlusion), as a result of settling

of the dentures or relationship change between the jaws, or both, without producing malocclusion not automatically corrected by wear or readjustment coincidental with any change or not easily and simply corrected with the stone or by mouth grinding.

8. As the last point, but not the least important, the use of inverted cusp teeth places denture work on an economical and business basis, making it profitable to both the patient and the dentist. Much less time is required to make and service dentures with the use of inverted cusp teeth.

The last fifteen years of my dental activities have been devoted exclusively to the one subject, denture prosthesis. I have given the experience gained in these many years the following name and description:

THE DENTURE CYCLE

In practice, occlusion, using interlocked cusp teeth, has been the condition most difficult to accomplish and to maintain. Dentures are in occlusion today, maybe, and out of occlusion tomorrow. Make baseplates, trace the gothic arch, register the condyle paths, take test-bites and check-bites, adjust the facebow, mount the case in the articulator, adjust the articulator, grind in the occlusion, regrind the occlusion, test the occlusion with carbon paper in the mouth, grind down the points of interference, cutting off the cusps with the stone in the handpiece until they are flat, have the patient chew carborundum, hold the dentures in place with "corega" or plate powder because of looseness as result of tissue change, rebase and finally remake the case — such is the denture cycle — and what a nightmare!

Occlusion, the once mystifying, time-consuming, inefficient and disappointing part of denture work, is now made simple, efficient and satisfactory with the use of inverted cusp teeth.

A DENTAL PERSPECTIVE OF THREE HUNDRED FIFTY-FIVE CASES OF GASTRIC CARCINOMA*

By HAROLD GOLDSTEIN, D.D.S., Rochester, Minn.

A SERIES of three hundred and fifty-five cases of gastric carcinoma in which dental examinations have been made in the Mayo Clinic were studied. In each case, roentgenograms of the entire mouth were taken and careful clinical examinations were made. Each case was graded as to degree of infection from the standpoint of periapical lesions and of periodontal involvement, often called pyorrhea. Grading was done on a basis of 1 to 4, grade 1 denoting the least involvement, and grade 4, the most extensive involvement. Only cases graded 2 or more, from a periapical or periodontal aspect, were regarded as sufficiently advanced for consideration.

The accompanying tabulation shows the incidence by number and percentage

*Work done in the Section on Dental Surgery, the Mayo Clinic.

of the two types of dental infection found simultaneously with gastric carcinoma. Data on a control series of 355 adult patients who also were given dental examinations are recorded. The control series was composed of patients as they presented themselves, regardless of their physical condition, if they were aged more than 30 years. The average age in the series with carcinoma was found to be 49.3 years; in the control series, 44.1 years.

Either severe periodontoclasia or periapical infection was found in 285 cases (80.2 per cent) of the series with carcinoma; whereas, in the control series, it was found in 158 cases (44.5 per cent). One can see that even in the control series, the proportion of infections of the mouth was fairly high; which can be accounted for undoubtedly by the fact that many of the patients who come to the clinic suffer from some chronic ailment. Nevertheless, the incidence of oral infection in the series with gastric carcinoma was 35.7 per cent greater than that in the control series. This observation is significant.

Periapical infection, with or without periodontoclasia, was present in 212 cases (59.7 per cent) as against 105 cases (29.8 per cent) in the control series. Extensive periodontoclasia with or without periapical infection was found in 222 cases (62.3 per cent); whereas, in the control series, there were ninety-five cases (26.3 per cent). In the malignant cases, there were nine edentulous persons as compared to twenty in the control series.

Broken, decayed, pyorrheic or projecting teeth have long been known to act as agents of chronic infection and irritation in the pathogenesis of carcinoma of the mouth, lip, tongue and floor, as well as of any section of the mucous membrane of the mouth. Ewing[1] and Bloodgood[2] have stated that oral carcinoma may be prevented if irritants are removed early from the mouth, or are never allowed to arise. Yet the possibility of oral infection as a source of chronic irritation and infection in the ultimate production of gastric carcinoma has not been stressed sufficiently.

Septic conditions of the mouth may affect malignancy through two channels: (1) direct irritation of the gastric mucosa as a result of constant swallowing of pus and septic products of periodontoclasia (so-called open sepsis), and (2) transportation by way of the blood stream of organisms or toxins from periapical or periodontal foci of infection to the gastric mucosa. Either path may produce pathologic changes, or vitiate existing lesions in the gastric mucosa. The experimental work of Rosenow,[3] corroborated by Haden,[4] Billings,[5] Nakamura,[6] Cook and Stafne,[7]

1. Ewing, James: Prevention of Cancer; in Cancer Control: Lake Mohonk Conference, 1926. Chicago: Surgical Publishing Company of Chicago, 1927, p. 1; 165-174.

2. Bloodgood, J. C.: Preexisting Lesions in Oral Cavity and Relation to Malignant Diseases, Dent. Rev., 31:357-378 (May) 1917.

3. Rosenow, E. C.: Focal Infection and Elective Localization of Bacteria in Appendicitis, Ulcer of Stomach, Cholecystitis and Pancreatitis; Surg., Gynec. & Obst., 33:19-26 (July) 1921. Specificity of Streptococcus of Gastroduodenal Ulcer and Certain Factors Determining Its Localization, J. Infect. Dis., 33:248-268 (Sept.) 1923.

4. Haden, R. L.: Dental Infection and Systemic Disease, Philadelphia: Lea and Febiger, 1928, pp. 81-91.

5. Billings, Frank: Focal Infection, New York: D. Appleton and Co., 1916, pp. 118-121.

6. Nakamura, T.: Focal Infection and Elective Localization in Ulcer of Stomach and in Arthritis, Ann. Surg., 79:29-43 (Jan.) 1924.

7. Cook, T. J., and Stafne, E. C.: Bacteriologic Study of Pyorrhea Alveolaris, Dent. Cosmos, 71:115-120 (Feb.) 1929.

and others, has shown that many chronic infectious processes, including ulcer of the stomach and chronic gastritis, may be initiated by pathogens coming from primary foci at the apices of infected pulpless teeth, or at the site of periodontal lesions. This work has been verified time and again by clinicians.[8] Eusterman[9] has emphatically demonstrated the significance of focal infection as the cause of duodenitis, focal gastritis and a certain percentage of gastroduodenal ulcers. W. J. Mayo[10] has said: "Cancer never develops in sound tissues and this knowledge is manifested in the understanding of physicians of the danger of permitting sources of chronic irritation to continue; the relation of chronic irritation to the external surfaces of the body is paralleled by cancer of the internal surfaces, but the evidence is necessarily indirect."

Hurst[11] stated that in every 100 deaths after the age of 40 years, five are due to carcinoma of the stomach. He summarized extensive research on the problem by saying that 75 per cent of the cases are secondary to chronic atrophic gastritis, and 20 per cent are secondary to chronic gastric ulcer, both precancerous conditions, often having their origin in dental and tonsillar sepsis, along with incorrect habits of eating. He emphasized not only the need for early treatment of the two precancerous conditions, chronic gastritis and chronic gastric ulcer, but also the prevention of the two conditions by proper dental hygiene and efficient dentistry.

Elimination of infection of the dental system, through preventive measures, competent dental therapeusis or correct surgical procedures might greatly reduce the large number of secondary chronic

DATA IN THREE HUNDRED AND FIFTY-FIVE CASES OF CARCINOMA OF THE STOMACH AND THREE HUNDRED AND FIFTY-FIVE CONTROL CASES

Dental Infection	Carcinoma		Contro's	
	Cases	Per Cent	Cases	Per Cent
Periapical or periodontal, graded 2 or more	285	80.2	158	44.5
Periapical, graded 2 or more, with or without periodontal	212	59.7	105	29.8
Periodontal, graded 2 or more, with or without periapical	222	62.3	95	26.3
Periapical or periodontal, graded 1 or less	70	19.7	197	55.5
Edentulous mouths	9	2.5	20	5.6

8. Austin, L. T.: Effect of Studies on Focal Infection in Dentistry with Special Reference to Extraction of Teeth. (Unpublished data.) Gardner, B. S.: Focal Infection: Dentist's Responsibility, J. A. D. A., 15:270-278 (Feb.) 1928. Stafne, E. C.: Dental Conditions Found in Duodenal Ulcer and Arthritis, Dent. Cosmos, 71:404-408 (April) 1929.

9. Eusterman, G. B.: Certain Clinical and Pathologic Aspects of Focal Infection with Special Reference to Teeth and Tonsils and Gastro-Intestinal Tract, Ann. Clin. Med., 3: 394-401 (Nov.) 1924.

10. Mayo, W. J.: Again the Cancer Problem, editorial, Surg., Gynec. Obst., 51:262-264 (Aug.) 1930.

11. Hurst, A. F.: Precursors of Carcinoma of Stomach, Lancet, 2:1023-1028 (Nov. 16) 1929.

processes, and so possibly hit at the very heart of a potent contributory agent in the etiology of precancerous lesions. Ewing has constantly taught that a rational basis for the prevention of carcinoma lies in the fact that the major forms of the disease are due to some form of chronic irritation. MacCarty[12] said: "In an experience with 3,374 gastric lesions at operation I have never seen a small carcinoma (2 mm. in diameter) that was not on the border of a chronic gastric ulcer."

Nothing positive is known concerning the etiology of carcinoma of the stomach, as is true of other forms of carcinoma. Hurst's observation of inherited liability and the constitutional condition of chronic gastritis or chronic gastric ulcer as a definite combination tending toward gastric malignancy is logical. The same formula, inherited tendency with chronic conditions, is maintained by authorities in various fields of medicine as the probable factors in the production of carcinoma in other regions. The statistics of the United States Census Bureau gives the information that one of every ten adults now living in the United States is destined to die of a malignant condition. If some hope is to be placed in removal of sources of chronic irritation, one naturally asks why only one person of ten succumbs to carcinoma, since it is fairly certain that some form of chronic irritation is present in a much greater percentage. W. J. Mayo[13] has said: "Individuals vary in their susceptibility to the cause or causes of cancer whatever they may be, and it is as logical to accept the hypothesis that 90 per cent of persons have greater resistance to cancer than the 10 per cent, as to attempt to form an explanation that only 10 per cent came in contact with the hypothetic causative agents which produce disease."

12. MacCarty, W. C.: Early Cancer of Stomach, J. Cancer Res., 12:1-8 (March) 1928.

SUMMARY

A tabulated survey of a series of 355 cases, in which a diagnosis of gastric carcinoma had been made, revealed that profuse dental infection, periapically or periodontally, was found in 80.2 per cent; whereas, in a control series of the same number of cases in patients approximately the same age, the incidence was 44.5 per cent.

Although little is known concerning the true etiology of gastric carcinoma, or, in fact, any malignant lesion, many authorities, several of whom have been mentioned, lean toward the theory of chronic irritation. The presence of advanced dental infection in 80.2 per cent of the cases of gastric carcinoma studied seems to point to at least one possible source of chronic infection. It appears fairly certain that infection of the dental system is found with extreme frequency in cases of carcinoma of the stomach. No attempt is made to dogmatize, although enough evidence is produced to be presumptive.

13. Mayo, W. J.: Susceptibility to Cancer. Am. J. Surg. 6:644-647 (May) 1929.

WHY USE THE FACE-BOW?

By J. E. TAFT, D.D.S., Hartford, Conn.

THE question, Why use the face-bow? has been asked many times, as well as questions of a similar nature, showing that there is still a doubt in the minds of many dentists as to the advisability of going to a great deal of trouble, and spending much time, in trying to turn out a scientifically made denture when they can please the patient just as well without all that waste motion.

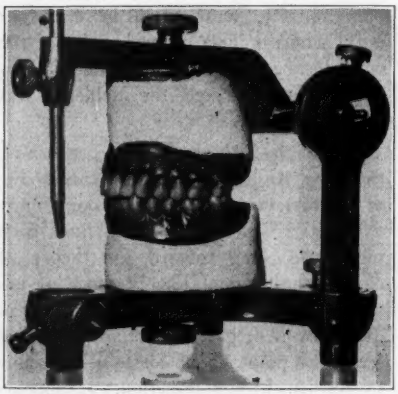


Fig. 1—Normal set-up (15 degrees right and left).

If the men who ask these questions are giving their patients dentures made on plain line articulators, I can easily say that the use of the face-bow would be a foolish waste of time. To those who are endeavoring to give their patients the best in denture service, I can just as easily say that the use of the face-bow is obligatory.

The first reason, and not a vital one, is that it makes the mounting of the case much easier. The real reasons are demonstrated in the accompanying illustrations.

Figure 1 shows a normal mounting with balanced occlusion in both right and left lateral movements; Figure 2, occlusion in the left working bite, and Figure 3, occlusion on the right side of the left working bite.

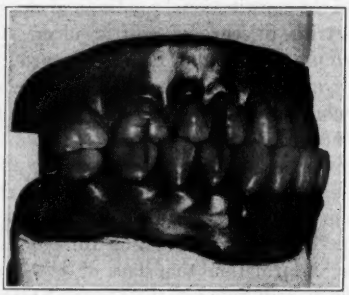


Fig. 2.—Normal left working bite.

These illustrations show an occlusion that will be the same in the mouth as on the articulator, because, as nearly as is humanly possible, the same conditions obtain on the articulator as in the mouth.

Next, a mounting of the same cases in centric occlusion is made, tipping them far over to the left.

Figure 4, illustrating the left working bite, shows considerable difference when

compared with Figure 2, correct occlusion in the same position.

The right side in Figure 5, wrong mounting is to be compared with Figure 3, right mounting. A still greater fault is found when a right lateral excursion is attempted. I say attempted, for that is so easily seen, but it is there just the same. In this position, the mandible is pushed forward of the position in Figure 2, because there is a longer radius than in the normal mounting, giving a flatter arc in the sector where the mandible moves.

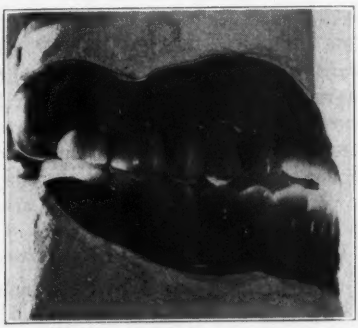


Fig. 3.—Normal right view; left working bite.

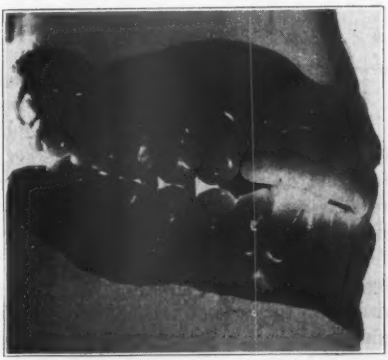


Fig. 5.—Wrong mounting; right view, left working bite.

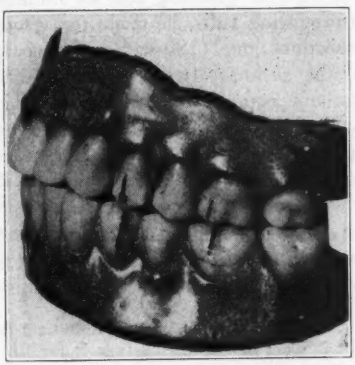


Fig. 4.—Wrong mounting; left working bite.

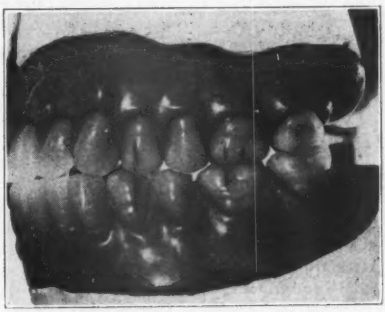


Fig. 6.—Wrong mounting; anterior left working bite.

all that can be done. Interference between upper and lower buccal cusps practically stops the movement.

One more position, too far forward, is shown in Figure 6. In this, as well as the one too far back, the fault is not

A mounting posterior to the correct position will show a retraction in lateral movements. Teeth set up with a faulty mounting are sure to have a faulty action in the mouth and to the same degree that the mounting is wrong.

AN INVESTIGATION REGARDING THE POSSIBLE TRAUMATIC ORIGIN OF ENAMEL TUFTS*

By HOWARD T. WHITE, A.B., Cleveland, Ohio

INTRODUCTION AND REVIEW OF LITERATURE

THE nature of the enamel tufts has been under discussion by numerous investigators since first seen and drawn, in 1851, by Linderer. Bödecker, in 1909, described them as brushlike or tuftlike processes originating at the dentino-enamel junction and radiating into the enamel, penetrating only the inner one-sixth to one-fourth. Different students of the question have held many and diverse views concerning the function and nature of enamel tufts. Some contended that they are of functional significance in the sense that they furnish nutritional pathways; others, notably Kantorowicz,[1] Brammer and Brauer,[2] and Brammer,[3] held that they are faultily calcified prisms due to metabolic disturbance during development; while still others, Hauser,[4] Gräff,[5] and Akamatsu,[6] considered them to be cracks in ground sections. Hauser and Gräff contended that the tufts are chiefly artefacts arising through trauma during extraction. Akamatsu also held that they are chiefly artefacts, but that they arise while the section is being ground.

Akamatsu, in his work, made 200 ground sections from human deciduous and permanent teeth. These included cross-sections at different levels and longitudinal sections in different planes. To test whether grinding was an influence in producing tufts, he made two groups of sections; one (180 sections) prepared in the ordinary way, and the other (twenty sections) by a method in which extreme care was exercised. He found that the tufts were completely lacking in longitudinal sections and that, in the cross-sections which were carefully prepared, their number was significantly less than in cross-sections ground by the ordinary methods. Hence, he concluded

*With the aid of the Crile Fellowship Fund.

*From the Laboratory of Histology and Embryology, Western Reserve University.

*Work done in a laboratory receiving a grant from the Scientific Foundation and Research Commission of the American Dental Association.

1. Kantorowicz, A.: Über die Ernährung des Schmelzes, Deutsch. Monatsschr. f. Zahnheilk., 31:925-947, 1913.

2. Brammer, F., & Brauer, K.: Über organische Substanz im Schmelz menschlicher Zähne, Deutsch. Monatsschr. f. Zahnheilk., 44:473-494, 1926.

3. Brammer, F.: Über Lamellen und Büschel im Schmelz menschlicher Zähne, Deutsch. Monatsschr. f. Zahnheilk., 48:753-764, 1930.

4. Hauser, K.: Zur Frage der Lamellen und Büschel des Zahnschmelzes, Inaug. Diss., Freiburg, 1920.

5. Gräff, S.: Zur Frage der Entstehung Deutsch. Monatsschr. f. Zahnheilk., 48:753-Verhandl. d. deutsch. pathol. Gesellsch., Jena, 1921.

6. Akamatsu, K.: Nochmals zur traumatischen Entstehung der sog. Lamellen und Büschel des Zahnschmelzes, Vierteljahrsschr. f. Zahnheilk., 44:551-567, 1928.

EXPERIMENTAL DATA*

Number of Pair of Sections	Number of Tufts per Mm. at Dentino-Enamel Junction in:		Greater Number of Tufts per Mm. of Dentino-Enamel Junction in:		Tufts per Mm. According to Part of Crown		Greater Number of Tufts per Mm. in:	
	1 Machine-Ground Section	2 Hand-Ground Section	3 Machine-Ground Section	4 Hand-Ground Section	5 Incisal Half	6 Cervical Half	7 Incisal Half	8 Cervical Half
1	9.1	8.7	+		9.1	8.7	+	
2	2.2	6.8		+	6.8	2.2	+	
4	9.5	8.7	+		8.7	9.5		+
6	7.7	3.4	+		3.4	7.7		+
8	9.0	10.6		+	3.3	10.6		+
9	6.5	9.8		+	9.8	6.5	+	
10	8.4	8.3	+		8.3	8.4		+
11	8.8	13.7		+	8.8	13.7		+
12	10.8	9.2	+		10.8	9.2	+	
13	10.4	12.3		+	12.3	10.4	+	
14	10.4	7.6	+		10.4	7.6	+	
15	14.4	12.4	+		12.4	14.4		+
16	9.3−	9.3+		+	9.5	9.3+		+
17	2.7	12.3		+	12.3	2.7	+	
18	9.7	8.9	+		9.7	8.9	+	
19	5.0	10.1		+	10.1	5.0	+	
Total	133.9	152.1	8	8	145.5	134.8	9	7
Average	8.4	9.4			9.1	8.4		

*Sections of pairs numbered 3, 5 and 7 were discarded because they were not true cross-sections.

that the tufts are not organic structures, but are artefacts due for the most part to the traumatism of careless treatment of the sections during preparation.

This paper is a report of an investigation designed to test the correctness of Akamatsu's claims. Since Akamatsu obtained but one section from a tooth, the

sections for his two groups were made from different teeth; that is, he did not obtain both a carefully prepared and an ordinary (control) section from the same tooth. In view of the small number of carefully prepared sections involved, such a method cannot rule out chance. To overcome the objection to such a procedure, a method was devised by which a control section could be obtained from the same tooth as the one from which the extremely carefully prepared section was taken, without in any way producing traumatism in the latter section. Obviously, sections so obtained would furnish data which would be more reliable and would furnish a check against the results of Akamatsu. I believe that the methods described below fulfil these requirements.

The investigation was undertaken at the suggestion and under the direction of S. W. Chase of this laboratory.

MATERIAL AND METHODS

The present work was done on extracted human permanent teeth which were fixed in 10 per cent formalin. As in Akamatsu's investigation, two different methods of preparation were followed: one, the ordinary method of machine grinding; the other, a method of cutting and grinding entirely by hand with great care.

Cross-sections alone were dealt with. That one of the pair which was to be prepared by hand grinding was treated gently from the very first. The slice to be carefully prepared was always cut from the tooth before the slice which was to serve as the machine-ground control section, thus obviating any possible effect on the hand-ground section which might be produced by the vibrations of the rather violent sawing process ordinarily employed in cutting the slice for the control section.

The method of cutting the slices for hand-ground sections involved the use of a coarse cotton thread (Clark's No. 8), which was soaked in a suspension of finely powdered (180-grit) carborundum in "three-in-one" oil. This thread was drawn back and forth across the tooth at the level from which the slice was to be taken. Both the tooth and the thread were kept well lubricated throughout this entire process. Naturally, the progress is slow. It takes from forty-five to ninety minutes to make a single complete cut through the crown of a lower incisor, but, by carefully sawing a section in this way, the production of friction, heat and vibration is reduced to a minimum.

After the slice which was to be hand ground had been obtained, the slice for machine grinding was cut from the same tooth by means of a rotating aluminum disk, to the edge of which a suspension of powdered carborundum in water was fed. If the incisal half of the crown had been removed by the thread-sawing method, it would be possible to remove a control slice from the cervical half by only one cut of the aluminum disk. It was considered preferable to make a cut with the disk on each side of the slice which was destined to be machine ground, thereby subjecting it to the full amount of traumatic influence.

Slices for "careful" as well as "ordinary" methods were cut from both the incisal and the cervical halves of the crown, the slices alternating in source so that approximately equal numbers of each type were obtained from each half.

The slice to be prepared in the "ordinary" manner was ground and polished on one surface, mounted on a disk of

the grinding apparatus with Dupont's household cement, ground to the desired thickness, removed from the disk, cleaned and mounted in balsam.[7]

The slice to be prepared in the more careful way was ready to be ground by hand without further treatment after the oil and carborundum used in the cutting process had been removed. Held by one finger-tip, it was pressed lightly against the surface of a Belgian yellow hone, then ground very slowly in the presence of a stream of water. The position of the section was shifted frequently so that the axis of grinding was constantly changing. The grinding was alternated from one side to the other every few minutes, and the section calipered from time to time until its thickness approximated that of its machine-prepared control. Then, it was run through the alcohol series, through acetone and xylene, and finally mounted in balsam. The process is obviously very tedious and time consuming, making frequent rests desirable, and requiring a total of from eight to ten hours, or even more, this depending on the thickness and surface area of the original slice, for each section.

Throughout the whole process, special pains were taken with the hand-made sections to eliminate any traumatic influence, such as undue friction, heat or vibration. The opposite was true in the preparation of machine-made sections, in which no attempt was made to eliminate such factors. Some such slices were even purposely sawed with more violence and ground with more pressure than are routinely employed.

The method of determining the relative number of tufts in the ground sections was as follows: By means of an Edinger projection apparatus, the image of the section was projected on a large sheet of paper, at a magnification of 36 diameters. The dentino-enamel junction and enamel tufts were accurately drawn; then the drawing was checked while the section was observed under the microscope. Next, the number of tufts was counted and the length of the dentino-enamel junction was measured on the projected drawing.

From data collected in this manner, the actual number of tufts per millimeter at the dentino-enamel junction was calculated. The results are recorded in the accompanying table.

COMMENT

By referring to the table, it will be noted that the number of tufts per millimeter at the dentino-enamel junction varies considerably both in the same tooth and in different teeth (columns 1 and 2). Furthermore, the number of tufts is greater just as often in the carefully ground sections as in those prepared by the ordinary method (columns 3 and 4). Also, the variation in the number of tufts is quite as marked in the hand-ground as in the machine-ground series (columns 1 and 2).

The results bear out Akamatsu's contention that the tufts are no more numerous in different parts of the crown, since the differences noted, both in the averages in columns 5 and 6 and in the totals in columns 7 and 8, are so slight in consideration of the small series involved as to possess no probable significance.

Beust[8] has claimed that enamel tufts are uniformly arranged. It was found

7. Chase, S. W.: Some Uses for Dissolved Celluloid in Preparation of Ground Sections of Bones and Teeth, J. Dent. Res., 10:251-254 (June) 1930.

8. Beust, T. B.: Physiologic Changes in Structure of Enamel After Tooth Eruption, J.A.D.A., 8:396-402 (May) 1924.

in this investigation that a marked lack of uniformity was the usual thing. There was a great deal of variation in the pattern of distribution of the tufts. In many cases, none occurred along one entire side of the section. Moreover, there was no uniformity as to where these bare stretches occurred, for, throughout the series, lengths of dentino-enamel junction could be found in every possible location—on the labial, lingual, mesial or distal surfaces or over the line angles, where no tufts could be seen. The sections prepared in this investigation show also great variation in the distance between tufts.

Akamatsu's claim that the tufts are artefacts due to trauma produced during grinding is not supported. The table shows (columns 1 and 2) that the average number of tufts per millimeter at dentinoenamel junction is approximately equal in the sections prepared by the two methods. Furthermore, the cases in which the greater number of tufts is found in a section ground by ordinary methods are no more numerous than the cases in which the converse is true (columns 3 and 4). Also, the variation in number of tufts is not significantly different in the two series (columns 1 and 2).

SUMMARY AND CONCLUSIONS

1. Akamatsu's method of investigation was improved on by devising a method by means of which a pair of sections from the same tooth could be compared, thus affording a control from the same tooth.

2. In a series of sixteen pairs of sections in which this technic was used, the contention of Akamatsu that the number of enamel tufts is less in carefully prepared than in ordinarily prepared sections is not confirmed.

3. Akamatsu's claim that the number of tufts is no greater in any particular part of the crown is essentially substantiated as far as incisal and cervical halves of the crown are concerned.

4. The number of tufts varies widely in different teeth and in different parts of the same tooth.

5. Since the variation in number is independent of the method of preparation, the enamel tufts are not chiefly artefacts produced by the sawing and grinding processes.

6. The pattern of distribution of the enamel tufts is very diverse in different individual teeth and in different parts of the same tooth. Beust's claims of uniform distribution and approximately constant numbers are not supported.

EXAMINATION OF TOOTH CEMENTS*

By MAX KULKA, M.D., Vienna, Austria

IN MY article, "Of What Value Are Laboratory Experiments in Judging Filling Materials?"[1] it was pointed out that the tremendous success of exact and technical science, the enormous progress of biology, etc., owe their origin only to the test tube experiments, and that, instead of rejecting the latter, we should be trained in their uses.

Not every dentist possesses the necessary laboratory equipment, modern training or chemical knowledge of this subject. Here, an attempt is made to enable the practicing dentist, without any special previous training, quickly and simply to form an opinion as to whether the new cement offered to him will prove satisfactory as a filling material.

When a dentist gets a new silicate cement and desires to compare it with the cement which he has used heretofore, he should proceed as follows:

1. Mix each sample and fill into a phantom cavity with outlined margins and note preparation differences.

2. Hold in readiness two wide-necked closable small flasks of white glass which are half filled with clear water.

3. Stir the powder of one cement with 5 drops of the acid liquid, which accompanies it.

4. Roll the mixture, prepared according to the directions for its use, on the palm of the left hand, forming a small ball with the index finger of the right hand. With the inside surfaces of thumbs and index fingers, form the mass into a tetrahedral pyramid, taking care that the sides, edges and corners are made solid by pressure.

5. Smooth the sides, edges and corners of this pyramid mass with the inside surface of the right thumb, and repeat with a clean handkerchief.

6. Make a clean mark on the test mass with a pencil, and note the time. If no thermostat is at hand, place the pyramid in the waistcoat pocket, to bring it to body temperature.

7. Make a similar test mixture of the second cement and proceed in the same manner.

8. After the expiration of thirty minutes, place the test mixture on the table and make the following observations:

1. Note *(a)* whether the test mixture is smooth and shiny, with the possible exception of a small crack or tear, which may be occasionally visible with the use of a pocket lens, or *(b)* whether the surface is covered with fissures and cracks that ramify into a network.

In the first case, the cement is good; in the second, it proves to be a mass capable of swelling, which mechanically takes up water and discharges it again by shrinking, showing no permanent volume and whose permeability is doubt-

*From the bureau for testing medical apparatus and instruments at the State Test Bureau, Committee on Dental Surgery.

1. Kulka, Max: J.A.D.A., 17:1501 (Aug.) 1930.

ful. After noting observation 1 in writing, place the mixture in question in one of the flasks, which has been half filled with clear water, and seal the flask. After three days, make the second observation.

2. Observe whether the water in the flask, when held against the light, *(a)* is perfectly clear, or *(b)* shows a sediment, which after shaking takes on a milky appearance, perhaps even clearly visible flakes. After the results are noted, the test mixtures are removed from the water and dried.

3. Hold the flask against the light, note the transparency of the filling bodies, and repeat observations again in thirty minutes under strong light.

4. Note carefully whether the surface is smooth and shiny or is chalky, covered with dust and shows stains. If smooth and shiny—the tests in which the water remained clear—the cement is good; in the second case—if the water was cloudy—the cement is inferior, because of incomplete binding of the acid and in the instability against the dissolving agent, i.e., water.

5. Scrape one of the lateral surfaces of the test mixture near the edge with a strong knife in order to determine its hardness. Try to chip off a corner, noting the effort used to accomplish this in testing for the firmness of the cement. The great differences in the mechanical qualities of the preparations are noted in this way. Also note the surface of the knife mark, and the chipped corner, as to whether the mass is a homogeneous, dense structure or a porous one.

By means of this simple but convincing experiment, one can draw the following conclusions: (1) which of the examined cements has the denser structure and more permanent consistency; (2) which of the cements binds well and completely; (3) which is most translucent, and least opaque and resembles enamel; (4) which is the most stable, and (5) which is the hardest, most solid, homogeneous and dense and, on the other hand, which is porous.

One should take care, when examining a new cement, not to mistake the appearance of a freshly mixed test filling or a freshly placed filling with the appearance and qualities of a filling that has been in place for a few days or longer.

There are deceptive cements which preserve their initial excellent appearance for from a few hours to a few days, and which, on exposure to saliva, quickly disintegrate, lose their translucency or prove unsatisfactory in other ways. This is a fact which can easily be proved by covering a filled tooth with rubber dam and examining the dry filling.

DENTAL ECONOMICS AND CHILDREN'S DENTISTRY*

By C. N. JOHNSON, L.D.S., D.D.S., Chicago, Ill.

THE wave of interest in dental economics that has swept the country from end to end has had its counterpart from time to time in numerous other waves of interest in numerous other subjects. It seems to be a propensity of our profession to seize on certain subjects at more or less regular intervals and to concentrate on those subjects almost to the exclusion of all other topics. For the time being, our profession might logically be charged with having a one track mind as far as relates to the consideration of anything except the one pet idea with which it for the moment seems obsessed.

If dental economics has made more than the usual appeal, it may be attributed to the fact that this subject touches in a tangible way the welfare of every practitioner, and thus it is natural that it should claim a wider interest than any other. But with this as with every topic, the time inevitably comes when it is largely threshed out and interest in it begins to wane. While this subject, on account of its practical bearing on our material welfare, may prove more tenacious than some others, I think I can observe certain indications of its approaching subsidence, and when the furor has passed, we may be led to ask ourselves how much good has been accomplished by the recent agitation regarding it.

Unquestionably, the rank and file of our profession needed a vigorous stirring up in the matter of economics. Most of them were notoriously remiss in their conduct of the business aspect of their practice, with the net result that altogether too many dentists were not by any means self-supporting in their declining days. The spectacle has too frequently been presented to us of prominent practitioners approaching old age without the wherewithal to support themselves, and in recent years those of us who are closely associated with the activities of the American Dental Association have been made to realize only too vividly, through the medium of the Relief Fund, that an altogether unwarranted number of our members are really in a class that may be termed indigent. While undoubtedly some of these cases are due to unforeseen calamity of some sort and are not to be accounted for on the ground of mismanagement, there are only too many who at one time had a good practice and were considered prosperous, but who have fallen by the wayside through lack of business acumen in providing for the proverbial rainy day which is supposed to overtake every one of us. In other words, they have not managed their material affairs in a way to be independent when the sere and yellow leaf begins to appear. It may be accounted, therefore, a very real obligation for a man in the fullness of his powers and in the heyday of his earning capacity to so husband

*Read at the guest convention of the Alameda District Dental Society, Oakland, Calif., Oct. 3, 1930.

his resources by a careful study of the economics associated with his practice that he shall make such provision for the inevitable decline that nothing in the way of illness or incapacity shall financially embarrass him.

The trouble is that most men have given scant study to this important matter, and have been content to drift along the line of least resistance and trust to luck to take care of their affairs. Luck seldom sees a man through the stress of business exigency, and the sooner the members of our profession take a sane view of the matter and protect their interests by common sense methods of business management, the better it will be for the general morale of our entire body.

As to the specific means that shall be employed to establish a successful practice, or to change an unprofitable one into one that is profitable, it might as well be recognized at once that there is no talisman by which this may be accomplished. In other words, no man can merely wave the hand and thereby accomplish a revolution in results. It must really come about, if it comes about at all, by the application of the fundamental rules of sane business procedure, the details of which must be carefully worked out with all of the factors involved in the situation clearly in mind. The most encouraging thing about it is that these rules are after all very simple, though their application to individual cases may be somewhat complicated and exacting.

To be brief with my suggestions, it is only necessary to state that a profitable practice may be enjoyed only by attracting and retaining an adequate number of patients, and then by so handling them that they will cheerfully cooperate with you in making the business relations of the practice advantageous to both parties, for there is one basic requirement that stands out with ever-increasing insistence and that is that the people you are serving must be satisfied not only with your professional service but with your business methods as well; and in order to be satisfied, they must be convinced that those methods are entirely equitable and that they involve consideration for the patient as well as for the practitioner. I have elsewhere made the statement, and I here repeat it with the utmost confidence, that no system of dental economics can ever be permanently successful that does not take into account the welfare of every party to every transaction. On this proposition I pin my professional and my economic faith, and I herewith submit it for your careful consideration with the settled conviction that it, and it alone, will lead to ultimate success.

To be more specific, I do not believe that any dentist can sit at his desk and with pencil and paper figure out a fee bill or an expense account that appeals to him as necessary for a profitable income, and make it work in practice unless he can convince his patients that it is just and reasonable. You can lead a horse to water but you cannot compel him to drink, and unless patients have the feeling that they are being treated fairly, they will go elsewhere. And please remember this, that today there are enough dentists in practice that patients are never at a loss to find a new one. The time is gone in most communities when a patient has to travel a hundred miles to find a dentist; usually, there is one next door.

I trust that I may not be charged with advocating a spineless system of conducting a practice, or with yielding for one moment a healthy independence of

attitude. I would not give the impression that I would ever submit to allowing patients to dictate how I should conduct my affairs, but I hope that I would never be so imperious that I would superciliously wave them aside with a lofty air and ignore their rights and privileges; for they have rights, and they should be granted their privileges.

The thing of prime importance is that fees should be established on an equitable basis so that intelligent people must recognize their justice, and this does not by any means imply that fees should be so low that the practitioner cannot receive an adequate return for his services. The cost of every commodity has advanced materially, and this fact must be reckoned with in the adjustment of professional fees. But before a proper fee can be demanded and received, there must first be the conviction in the mind of the practitioner that the fee he is asking is perfectly just, and, in addition to this, his demeanor must be such that his conviction is conveyed to the patient. People are intuitive about this, as they are about many other things connected with a professional practice, and in dealing with a man it is seldom difficult for them to sense the fact that he is treating them fairly or otherwise. In the most satisfactory practice, and be it said the most profitable one, the patient applies for service year after year, accepts the service on faith and pays the bill in the same faith, secure in the conviction that whatever the service and whatever the fee, it is all regulated on the basis of equity and justice. Under such circumstances, the question of fees is seldom or never discussed, and there grows up between patient and practitioner a cordial community of interest, and a real friendliness that results in the sweetest savor of professional life. It requires time to establish confidence of this kind, but it is so well worth while that it should be the aim of every professional man or woman. With it, professional life is a constant joy—without it, professional life is barren of the best there is in it.

I wish I had the time to go fully into some of the specific requisites for conducting a successful practice and for securing a sound economic result. I should like, for instance, to take up the question of overhead expense and its relation to income, a matter that is sadly neglected by many practitioners. I should like to study with you the proper utilization of time, which has a very direct bearing on a profitable practice. Incidentally, and in this connection, I may remark that if the dental profession of this country are ever to enjoy a really satisfactory economic evolution, it will more certainly arrive through the medium of a systematic and intelligent utilization of their time rather than through a radical increase in fees. This is something for all of us to think about. I should like to point out the possible relation of psychology to the successful management of a practice; and, above all, I should like to consider in some detail the problem of investments for professional men. Each of these is intimately associated with the subject of economics and each would require an entire paper for its adequate elucidation, but I must hasten on to a consideration of the second phase of the topic allotted to me.

In passing, I should like to call attention to one fact that should be recognized. In the solution of these problems, the practitioner must rely on his own initiative and be governed by his individual environment. Certain rules of the game may be suggested and advice

may be furnished that will prove helpful, but in carrying out the details of any reform in his business affairs, the dentist may as well realize that it is strictly up to him, and that the logical thing for him to do is to study his own situation in the light of his manifest environment and institute the proper and necessary reorganization suitable to his own case. Many a man has made wreck of his affairs by blindly instituting certain radical regulations on the advice of some one else without due consideration as to whether or not they might accord with his individual requirements. This is not intimating that reform is not needed in many offices, but that the reform must be such as to meet the demands of the case in hand. Otherwise, disaster will follow. To all of which I may add that if the intelligence of our members is not sufficient to solve their individual problems with a little wholesome and fundamental suggestion, these problems never will be solved. The one thing needful is that each man shall take himself seriously in hand and devote the requisite study to this important matter—something that has not been done by the large majority of our members in the past.

CHILDREN'S DENTISTRY

At first thought, there would seem to be little connection between the subject of dental economics and children's dentistry, but a close scrutiny will reveal a very intimate relationship between the two, and this relationship grows closer the more it is studied.

Children's dentistry is the one topic, aside from economics, that is today claiming the major interest of our profession. Its significance is daily becoming more apparent, and the man who assumes to ignore it is overlooking something very vital as far as his professional welfare is concerned. Aside from the moral obligation involved in the care of children—an obligation than which there is none greater—the question has a utilitarian phase that should not be ignored. Of course, there are certain specialties that do not come under the category about to be mentioned, but it concerns every man or woman who is in general practice, and while specialists are multiplying very rapidly, the fact remains that most dentists are following general practice.

If a dentist does not elect to take care of children, the time will inevitably come when his practice will dwindle and he will not have enough patients adequately to support himself. This has too frequently been demonstrated to be taken with skepticism. The reason for this is that there is always more or less of a wastage among adult patients in every practice, owing to natural causes —change of residence and therefore of personnel, removal by death, which grows greater as age advances and various other causes which must be reckoned with. Unless, therefore, the dentist keeps constantly feeding his practice by the influx of children, the time inevitably arrives when he is seriously in need of patients and is facing what is tantamount to a failure in practice. There is no more pathetic spectacle than this, particularly when practice is needed for financial support.

The fact that a dentist does not like to work for children is no excuse for ignoring or neglecting them. A professional man assumes an obligation that is different from that of the tradesman and he is in duty bound to serve all of those who need him regardless of whether the service is agreeable to him. This is fundamental.

Aside from this, how anyone can fail to get a real thrill out of working for children, I cannot imagine. They turn an otherwise drab and humdrum day into the very joy of living, and they bring a brightness into the office that is akin to the sunshine of heaven itself. True, they are sometimes mischievous—bless their hearts—and certain of them show a sad lack of proper training at home, which makes them difficult to manage in the office; but all of them are interesting and most of them are amenable to intelligent handling and proper guidance. In some particularly obstreperous cases, it becomes a real game to see which wins, the child or the practitioner, and a good game is really the spice of life, so why complain about a little thing like that? Accept it all in the day's work and get the most fun you can out of it. Be assured of one thing, that there is no greater satisfaction in professional life, aside from the privilege and opportunity of relieving suffering, than to take a nervous and highly-strung child and so manage him that he not only comes to do your bidding but also comes to love you for compelling him to do it. The loyal and hearty friendships that grow up between children and the professional man savor of the sweetest things in life, and the practitioner who is oblivious to this is really missing the most joyous possibilities of his career.

And there is a practical side to all of this which cannot be ignored. We are constantly talking about the prevention of disease and dreaming of the day when it may be brought about. In the mind of every man who has vision or imagination, there is the perennial mirage of a coming emancipation from the ills of dental affliction. Without this hope, the future would be drear indeed, and the nearer we approach the goal, the more anxious we become that it shall ultimately be brought about. There are very many angles to this problem of prevention, but of one thing we may be absolutely certain: if prevention is ever achieved, it must come through the medium of service to the children. In no other way do we see any prospect of success. How it shall be brought about we cannot now say, whether by a more rational diet for children and for expectant mothers whereby a greater resistance is built up to combat disease; or by some means through which we may directly attack the micro-organic host that constantly lie in wait to seize the earliest opportunity of working destruction on the dental tissues; or whether the thing we call mouth hygiene may be the means of controlling the trouble we are still so much at sea about, we are unable to state with certainty. But we are very sure of one thing, that the care of children will prove the keynote to our success, and everyone practicing dentistry should concentrate on this service.

A baneful effect is sometimes spread among the laity by the attitude of certain members of our profession who do not like to work for children. We go out into the highways and byways and preach the gospel of early care of the teeth, and the parents, heeding the advice, take their children to the dentist for service, only to be too often told that it is not worth while to care for the deciduous teeth, that they are soon to be lost anyway and will be replaced by the permanent set. When the parents have been told that the preservation of the deciduous teeth is very important on account of the resultant effect on the development of the jaws and the regularity of the permanent teeth, this attitude of the dentist is confusing, and it naturally leads to distrust of dentists generally. If a man

decides that he cannot or will not work for children, it may be his privilege to decline to do so, but he should at least be honest enough to refer them to someone who will. He owes this consideration, not only as it relates to the welfare of the children, but also for the reputation of his profession. A serious reflection is sometimes passed on dentists as a whole by some of our welfare organizations, on account of this delinquency on the part of certain of our members, and if we wish to maintain the good name of dentistry, we must do all in our power to remedy it.

While, as has just been intimated, we do not yet know all there is to know about prevention, there is at least one practical aspect of it that has strongly impressed those of us who have given it close study, and this relates directly to the care of children's teeth. In a somewhat extended consideration of the varying manifestations of susceptibility and immunity in different mouths, we have observed this clinical fact: that there are periods in life when mouths are prone to susceptibility and others when they are more likely to be immune. This much we have at least learned, even though we cannot today place our finger on the really significant factor in susceptibility. Youth is the most susceptible period of all, and clinically we have also learned that if we take a child and care for the teeth, deciduous as well as permanent, assiduously keeping decay under control by filling, and making the mouth wholesome by the removal of deposits and by daily care on the part of the patient—in other words, the practice of so-called oral prophylaxis—we shall thereby establish in most cases a condition of immunity even where there have been decided manifestations of susceptibility. Not only that, but we can advance the usual period of immunity very materially, and we may bring the average individual who will cooperate with us up to adult life and even to old age with a serviceable set of natural teeth. I have been so impressed with this in practice that I have repeatedly called attention to it, and I reiterate here what I have so frequently said in private and in public, that this to me seems the most tangible plan of prevention ever presented for the average practitioner to follow. While it demands of the dentist the most assiduous care and in certain instances a great deal of devoted supervision, and of the patient a reasonable amount of cooperation, it does offer a reward that is fully commensurate with all of the trouble that is taken by either the patient or the practitioner. If you will pardon a personal reference, I can confidently state that during the many years in which I was in full and active practice, I cannot recall a single case in which I had the care of the patient from childhood and enjoyed a loyal cooperation that I ever lost the pulp of a single tooth. If this can be accomplished by one practitioner, it can be done by others, and if the majority of our members would enter heart and soul into the problem of caring for children's teeth, and if our patients could be educated to the necessity of proper cooperation, we should soon have the final answer to that much mooted question of the pulpless tooth. I hope to live long enough to see my profession rise to the possibilities presented to them in this regard, to the end that we shall have fewer and still fewer pulpless teeth for us to haggle over.

No one knows to this day the precise status of the pulpless tooth, how much or how little harm it does; nor is it an easy matter to determine. But we do know that if we prevent death of the

pulp, we shall at least save our patients and the profession from a great mass of questionable polemics, and be able to take a little comfort in the practice of dentistry.

Manifestly, it is impossible in the present paper to go extensively into the technical details of caring for children's teeth. With an audience of experienced practitioners, this seems hardly necessary, but there is one phase of the subject that seems of growing importance, and I can never content myself without reference to it. Mention has just been made of the desirability of preserving the deciduous teeth. In a certain relation, it is not only desirable, but also necessary, if we are to do our full duty to the child. The question of irregularity of the teeth is looming larger and larger on the dental horizon, and in view of the fact that the maintenance of the proper space in the jaws to accommodate the permanent teeth is largely contingent on the preservation of the deciduous set, it at once becomes an insistent duty to devote our best energies to this problem. Orthodontists, who claim my unbounded admiration and gratitude for what they are accomplishing for our children, are more and more insistent on the necessity of maintaining adequate space in the jaws of the growing child, and we should heartily cooperate with them to the extent of our ability. More and more is orthodontia being recognized for its beneficent ministrations to the human family, and orthodontia is largely a service to children. I sometimes envy my orthodontist friends their privileges in this regard. I am really thrilled when I think of the transformations they make in the physiognomy of children. We are all familiar with cases in which they have taken the profile almost of an idiot and changed it to the grace and symmetry of divinity. All honor to our orthodontists. The general public is not yet fully awake to the possibilities of this humanitarian art, and we should constantly spread the propaganda, and herald to the world the fact that there are members of our profession who are essentially able to work miracles in the faces of little children. Not till this fact is fully known shall we absolve ourselves of the obligation that we owe the people, because, up to this time, there are altogether too many children who have been handicapped for life by deformity that might have been corrected with the proper care. This deformity is one of the most conspicuous that afflicts humanity, and there is a sacred obligation that devolves on our profession and on society at large to see that it is prevented. I have been so impressed with the unfairness to children in permitting such conditions to exist that I have repeatedly made the statement in public, which I now reiterate, that in this age of our so-called civilization, no child should ever be allowed to grow up with a physical handicap that modern science can correct. I stand on that statement as the fundamental article of my faith as far as children are concerned, and I shall continue to repeat it whenever occasion presents. How this statement shall be made manifest in a practical way, I am not wise enough to predict. That it must eventually be adopted as a general principle, I like to believe, because I am firm in my conviction that society will one day recognize its real duty to children. When we stop to consider that no child is ever responsible for the fact that it is born, that it is launched in the world without the possibility of being consulted and that it is obliged to accept its lot in the throb and beat of circumstance and chance, we should surely have more con-

sideration for children. The moment that little lump of humanity first sees the light of day, there is immediately a moral obligation devolving on someone, whether the parent alone or society at large, to see that it has a fair chance in life, and when this is generally recognized, we shall see fewer of these pathetic waifs of humanity tossed out into the world to struggle and sometimes to sink.

In thus coupling the consideration of dental economics with the care of children's teeth, we are more logical than at first thought would seem apparent. The connection might be emphasized in greater detail if we had the time, because there is an intimate connection in several particulars; but, on the present occasion, we must content ourselves with the mere statement that this is true, and then take a moment to refer briefly to a certain distinction that should be made between the two topics.

While the discussion of dental economics is perfectly legitimate and altogether praiseworthy up to a certain point, constant harping on this subject by professional men may easily become more or less demoralizing. The moment that the business side of dentistry is magnified above the professional side, there is danger that irreparable damage may be done, and our professional integrity questioned. A sane and logical consideration of our material interests is one thing, and it is perfectly legitimate, but the continual emphasis on the money we are making or would like to make is another; and we cannot afford, in the present stage of our professional development, to sell our birthright for the proverbial mess of pottage. Above and beyond everything else, we must maintain our professional status and dignity, and we shall do irreparable damage by jeopardizing them with too much materialism.

With the discussion of children's teeth, the case is entirely different. No emphasis is ever too great to be placed on this topic. In season and out of season, it should be the chief burden of our song, and it should be made an integral part of every program prepared for a dental meeting. When we stop to consider the significance of this subject, it is difficult to magnify its importance. It is the real keystone of our dental arch, and its interest for us never should be permitted to lag. It embodies not only a professional interest, but a sentimental and a humanitarian one as well. Anything that affects the welfare of children makes its especial appeal to right-thinking people the world over. Around the idea of childhood, there hover the tenderest sympathies of our finer nature. The clinging arms of children sanctify and ennoble us. They gently wean us from the sordid side of life, and transport us to an atmosphere of purity and peace. They emancipate us from the humdrum and the commonplace, and point with prescient vision to the rarer, better impulses of our nobler selves. Children are our greatest inspiration and our surest refuge. They are our real regeneration and our benediction. Through them, the world is to be made better, if it is ever to be made better at all.

PERIODONTOCLASIA: A BRUSHING TECHNIC AND SOME PERTINENT OBSERVATIONS

By ARTHUR SAMUEL CHICHESTER, D.D.S., Great Falls, Mont.

IT is not my intention to present a new technic, generally speaking, in the treatment of periodontoclasia, but rather to suggest some practical adjuncts in the course of treatment and emphasize their importance. I shall outline what I believe to be the rational treatment of this disease in a broad sense, permitting the technical details of the various processes of treatment to dovetail in where they fit best. There are many and sundry medicaments used to eliminate diseased epithelial tissue in the interproximal space, probably most of them having a satisfactory effect if properly applied. There are various methods and armamentariums for scaling root surfaces, nearly all serving a useful purpose, and there are several surgical technics which produce satisfactory results in the hands of different operators. It is quite generally agreed that checking and grinding to balance the bite and relieve traumatism, as indicated, is of great importance, particularly in obtaining surgical rest, and most important of all are the different ways and means of maintaining mouth cleanliness and tissue stimulation, both in the office and at home. I shall outline then what to my mind constitutes a routine course of treatment in handling periodontal disease, touching only briefly on each, except the last, i. e., cleansing and tissue stimulation, which I shall outline in some detail.

ROUTINE PROCEDURE

First Step.—General physical examination is made in all cases where the progress of pyorrhea is marked and much pus exists. Most particularly is this important when some form of surgery is to be resorted to or perhaps teeth beyond redemption are to be extracted. To undertake surgery in the presence of such wasting diseases as diabetes or nephritis might easily lead to serious, if not fatal, consequences. It is also important to know the coagulating time. Cooperation with the patient's physician in these cases will assure a safe, logical and scientific diagnosis.

Second Step.—A full-mouth roentgen-ray examination is made. The only exception to this rule is in the interest of economy—it may prove to be, doubtful economy.

Third Step.—Local premedication reduces bacterial volume and especially takes care of a probable Vincent's infection. There are a great many excellent treatments, and we each have our favored few.

Fourth Step.—All gingival irritants are eliminated. Thorough and careful scaling removes calcareous deposits and overhanging fillings. All ill-fitting dental restorations, such as crowns, bridges, etc., are removed. It may be feasible to complete the scaling operations as the subsequent brushing technic is undertaken or during surgical procedures. If

interproximal medication and a brushing technic are undertaken early in the course of treatment, as the soft gingival tissue retracts deposits previously overlooked may be picked up, and eventually all will be removed and the root surfaces polished. If radical surgical interference is indicated, it will facilitate matters greatly, both for the comfort and for the convenience of the patient and the operator, if much of the scaling is done while the tissues are anesthetized. Grinding is done at this time to balance the occlusion.

Fifth Step.—All pockets are drained and are left after treatment so that they will drain themselves. To my mind, all pockets of any depth should be surgically eliminated, the interproximal process being left smooth and convex instead of concave and rough, as the bottom of most pyorrheal pockets are. To obtain and maintain drainage is the first principle of surgery. It is one thing for the dental surgeon to remove the contents of a pus pocket mechanically, but it is quite another to keep it drained, unless the pocket itself is eliminated. With the pocket eliminated and the interproximal space open, the patient may successfully assist Nature to combat bacterial growth.

Sixth Step.—Rehabilitation is made of interproximal tissues. This step may be properly divided into five subdivisions: (*a*) Education of the patient regarding the seriousness of such infection, particularly from the standpoint of general health, economy, esthetics and facial symmetry, comfort and utility. Unless the importance of a preventive oral health program is thoroughly instilled, there is little hope for the permanent recovery of victims of periodontal infection. Indifference and slothfulness on the patient's part can end only in the failure of the whole undertaking. (*b*) Dietary regulation. (*c*) Correction of faulty elimination. The patient should drink plenty of water, establish regular habits in bowel elimination and promote skin elimination by regular outdoor exercise if at all possible. (*d*) Stimulation of the interproximal tissue and cleaning of tooth root surfaces. This last step has probably a greater influence on the prognosis of the disease than any other, for it is by the external, internal and eternal vigilance of the patient at home that periodontoclasia may be cured and kept cured, at least as far as local symptoms are concerned.

There are a great many different tooth and gum massage brushes on the market, a fair percentage of which may be effectively used as general utility brushes, although most of them are too large and, in my experience, none of them can be made to penetrate far enough into the interproximal space to cleanse the tooth surfaces thoroughly nor massage the inaccessible and vulnerable gum tissue. I have never talked to a periodontist yet who was completely satisfied with his choice of toothbrushes.

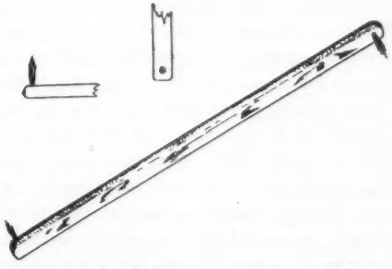
To attempt to correct this deficiency for these special cases particularly, I have had built a small, double-ended brush with a single tuft of tapered, extra hard, unbleached bristles on either end. The tapering of the point of the tuft is shaped so that it may be readily introduced into the space to be brushed, the side of the bristles then being used for the cleaning and stimulating. Then by a revolving and up and down movement, the sides of two teeth at the cervical line and upward or downward, as the case may be, are thoroughly cleaned as with a combination brush and porte polisher, and, most important of all, the gum tissue is stimulated. Particularly when the interproximal spaces have been opened through the

surgical removal of much tissue, this single bristle tuft serves most effectively, aiding in building up the tissues to normalcy before the patient leaves the chair, and also making it possible for that patient to "carry on" at home just as effectively as his dentist did in the office. This "home work" is, after all, the crux of the whole treatment regardless of the technic used, if the case is to stay cured.

A little more detail in the use of this interproximal brush will not be amiss. The hardness of the bristle is necessary in order that it may withstand vigorous usage, and since it is used only between the teeth, it must of necessity take considerable time to make the rounds buccally and lingually, both above and below. If a powder is used as a dentrifice, the brush is dipped into it and applied to each space, and a paste may be used the same way if it is squeezed into a small dish. Naturally, this little brush must be used as an adjunct to a larger general utility brush, which should be used afterwards to take care of the broader, lateral tooth surfaces. If there are no abnormal spaces between the teeth, the interproximal brush has no value, yet how many people are there over 35 years of age who can boast of such an ideal mouth condition?

In my hands, and in the hands of most of my patients who have it, the interproximal brush is practically 100 per cent effective, although it takes a little more time. The question arises, Will the patient use it and take the necessary time? To this, I can only say that time and persistence is "of the essence" of the contract that the patient makes if he expects a permanent recovery from periodontal disease.

Various widths of tape are often found useful in polishing the interproximal root surfaces, and, for the anterior teeth, I think tape has its place. The dentist always has occasion to use it during treatment, and the patient can also find its use beneficial, but owing to the concavity on the mesial and distal aspects of the molar roots, tape applied on those root surfaces touches the buccal and lingual angles, but bridges across the gap between. This fault I find corrected in using the interproximal brush as a porte polisher, and it is much handier. Small wisps of cotton may be tied at 2-inch intervals on dental floss and pulled back and forth through the space, serving a twofold purpose as another assistant in reaching this concave root surface. If the cotton wisp pulls through



Interproximal cleansing and massage brush used by author. Above, right, cross-section; left, horizontal section.

with some difficulty, it wipes both concave surfaces of two tooth roots and is quite an effective gum tampon as well.

Most emphatically, the economical aspect of periodontal treatment must be considered in this great land of ours, where more than 80 per cent of the population have incomes of $2,000 a year and less. It is better to scale and polish as thoroughly as possible in two or three sittings and at the same time teach proper mouth cleansing and stimulation with adequate brushes than to condemn mouths as hopeless just because their

owners cannot afford necessary radical treatment. Many can afford to spend $10 or $15; few, $200 or $300. If the dentist in general practice does not soon do more educating along preventive lines, he will do less practicing in all lines. A point quite generally overlooked, it seems to me, is the emphasis that should be placed on mouth hygiene in the care of all hospitalized patients. It should be regular routine in every hospital that the patient, unless in an emergency case, have a thorough prophylactic treatment before he is admitted. The first thing the patient receives when he is admitted to a hospital is a bath and a thorough cleansing of the alimentary canal, except the mouth. This oversight is most inconsistent and, in the majority of cases, makes oral hygiene impossible, or at least superficial. Many of these patients are too sick to care for their own mouths, in which case the nurse should do it for them. If they are too sick to wash their own faces, they are too sick to care for their own teeth. In fact, routine toothbrushing by the nurse should be established in every hospital worthy the name and the nurse should be a teacher of proper oral hygiene. That such an addition to hospital routine would materially hasten convalescence, there is no doubt.

I have just suggested proper oral hygiene. What constitutes proper oral hygiene? I am going to ask the question, What constitutes proper tooth brushing? One dentist says one thing, and another's remarks on the subject are diametrically in opposition. One school of thought directs you to brush toward the crown of the tooth, another in just the opposite direction. They can't both be right, or perhaps one way is as good as another.

I use a technic that applies the maximum brush pressure toward the root of the tooth, using the side of the brush, so that the end of the bristles will not prick nor lacerate the gingival margin. By using a small, long-bristled brush with a vibratory, circular motion, the lateral surfaces of the teeth are effectively cleaned and thorough lateral stimulation of the gum is obtained.

Is it not high time that tooth brushing should be standardized? I agree that medicine and dentistry are not fixed sciences and hence do not lend themselves readily to standardization. But let us standardize the few departments of the professions that can be standardized, particularly where prevention and the public weal are so vitally concerned. Black's cavity forms have stood the test of standardization for many years. They probably always will. We have commissions for research delving into matters which to my mind are of far less importance than a proper technic in tooth brushing. Should we not immediately settle this moot question once and for all so that we can all tell our patients the same story and be right in the telling?

THE THREE-QUARTER CROWN AS A FILLING FOR ANTERIOR TEETH

By G. M. FISCH, D.D.S., Rock Rapids, Iowa

THE three-quarter crown is usually thought of in association with bridgework. For esthetics, stability and aid in conservation of the dental pulp, it is, as a bridge abutment on anterior teeth, almost indispensable. Its preparation calls for a minimum loss of tooth structure, which is so much desired in restoration of a sound tooth, as is often the case in bridgework.

Before the three-quarter crown was introduced, the gold shell and dowel crowns were all that were available for bridge abutments. The gold shell crown was objected to because of its ugly display of gold, which has been responsible largely for the disfavor in which it is still held. To overcome this, the Richmond crown was resorted to. When one considers how the retention of pulpless teeth in the mouth is now so widely frowned on, it is almost unbelievable that it was once considered good practice to remove the crown of a sound tooth and extirpate a healthy pulp solely to provide a bridge attachment. The three-quarter crown most certainly has been a godsend.

How many times has it been considered as a filling—as a restoration for anterior teeth when considerable tooth structure must be sacrificed to provide retention? Not so often as it should. There are many cases in which large cavities are present on both proximal surfaces of the incisors and cuspids but have not advanced to the point where the pulp is involved. The common practice has been to recommend the use of gold foil, but often the finished cavity walls are so frail as to make it almost impossible to use a plugger without ruining the tooth.

Also, a three-quarter crown can be constructed to give a much more pleasing and harmonious appearance in the front of the mouth than many fillings do.

Not only does the three-quarter crown assure better esthetics, but it also calls for less destruction of sound tooth structure. At the same time, it is of greater stability and affords protection against further destruction of the tooth in a manner not true of proximal fillings. I have experienced more trouble with the anterior proximo-incisal inlay than with any other type of filling. The fault was in the lingual incisal wall, which often broke out and allowed the inlay to become dislodged.

Many operators use synthetic porcelain almost exclusively in the cavities illustrated through reluctance to place gold foil, either because of fragility of the cavity walls or because of the temperament of the patient. It is here that the three-quarter crown offers possibilities that are not fully utilized by dentists today. The indiscriminate use of synthetic porcelain is on the wane. It is being regarded more and more as a temporary

filling, which is all that it is. Therefore, the three-quarter crown deserves a prominent place in dental practice; it should not be confined to bridgework alone.

Too often, men outdo themselves to make its use difficult. Frequent failure of the finished crown to go to place discourages many. Most writers lay the blame on the preparation, but the recent findings of Drs. Taylor and Paffenbarger have brought to light the inadequate casting technics and materials most of us have been relying on. If the casting ring is lined with a sheet of moistened asbestos, and the wax pattern invested in either green investment or "pyromold No. 1" and, after setting, is heated to a high temperature and cast immediately, better results will be obtained. At least, such has been my experience.

Fig. 1

Fig. 2

Fig. 1.—Labial view of upper central incisor with three-quarter crown restoration. The display of gold is small as compared with that in Figure 2.

Fig. 2.—Labial view of upper central incisor with proximal gold filling and proximo-incisal gold filling. The inharmonious appearance as compared with the more esthetic one in Figure 1 is evident.

TECHNIC OF PREPARATION

Figure 3 is a drawing of a typical upper left central incisor which will be taken as an example.

Using a carborundum separating disk seven-eighths inch in diameter, we cut through the distal contact point, holding the disk at such an angle as to cut at the expense of the lingual portion of the proximal surface. The slice is carried to the distolabial line angle as shown in Figure 4 (labial view). The operation is repeated on the mesial surface.

When these two steps are completed, the tooth should appear, from the labial aspect, as depicted in Figure 5. The proximal surfaces are parallel to each other. They may converge slightly incisally, which makes the tooth somewhat wider at the gingival than at the incisal.

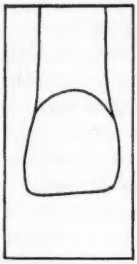


Fig. 3

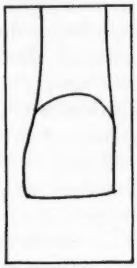


Fig. 4

Fig. 3.—Labial view of upper central incisor.

Fig. 4.—Labial view showing slice removed from distal surface.

Figure 6, the lingual view, illustrates how the slices have been made at such an angle that more of the enamel is removed as the lingual aspect is approached. This makes for a minimum showing of gold on the labial surface and provides the bulk of the metal for strength at a concealed location.

The next step is to bevel the incisal edge with a mounted stone, again doing so at the expense of the lingual surface, as indicated in Figure 7. The purpose in

doing this is the same as in the previous steps, namely, to show as little gold in the front of the mouth as possible. The lingual surface is then reduced, just enough being removed to free the occlusion to the extent of allowing a proper thickness of gold and further to take care of undercuts.

With a tapered cross-cut fissure bur No. 700, grooves are cut on the proximal surfaces parallel to the incisal third of the labial plate of enamel. The groove will not be perpendicular to the long axis of the tooth but will be at an angle, as in Figure 8. It should be deeper incisally to avoid any danger of undercutting.

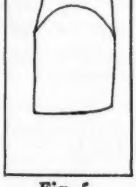


Fig. 5

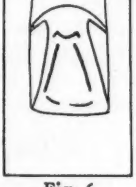


Fig. 6

Fig. 5.—Labial view showing slice removed from both mesial and distal surfaces.

Fig. 6.—Lingual view showing mesial and distal slices removed at expense of lingual surface, providing bulk of metal for strength at concealed position.

The preparation is finished by rounding the sharp corners and removing any part that may overhang.

Do not attempt to produce a shoulder at the gingival. This, which many insist on, is the step that renders the three-quarter crown preparation so difficult. If the finished crown is thin at the gingival and ends just under the free margin of the gum, permanent injury to the gum tissue or a recurrence of caries is less likely to occur than if a shoulder is produced.

It will be noted that no groove or step has been cut in the incisal portion of the tooth. Just why it was ever advocated is hard to understand. The three-quarter crown was introduced some time after Black brought out his system of cavity preparation. In proximal cavities restoring the angle, Black, in his text, used an incisal step for retention much in the same way that a proximo-occlusal cavity is prepared in a posterior tooth. Black's teachings seem to have influenced those who brought

Fig. 7

Fig. 8

Fig. 7.—Proximal view showing amount to be removed from incisal aspect, again at expense of lingual.

Fig. 8.—Proximal view, showing proximal groove parallel to incisal third of labial plate of enamel. The incisal groove is absent.

out the three-quarter crown preparation to keep an incisal step.

A glance at Figure 9 will show how needless it is for retention. This drawing, together with Figure 10, is a lateral view of an upper and lower incisor in an incising bite relation, showing how a three-quarter crown can be displaced in mastication. The force of the bite is

focused at *A*. As the body of the tooth would, of course, prevent labial and proximal displacement, it is in the lingual direction that the crown may be dislodged, as indicated by the arrow. In Figure 10, we see how the crown tips out, following the principle of the lever of the first class with the fulcrum at *A*. With the incisal step as the fulcrum, it is easily seen how futile it is to look for retention. It is the gingival portion of the crown that moves in displacement and demands something to hold the restoration to place. This is supplied in the proximal groove, which explains why the operator should not allow this groove to fade out too much at the gingival. The incisal third of the crown is also kept from being pushed in a lingual direction sufficiently by the proximal groove to render the addition of the incisal step superfluous.

Fig. 9

Fig. 10

Fig. 9.—Lateral view of upper and lower incisor in incising bite relation.

Fig. 10.—Another lateral view in incising bite relation, showing crown being dislodged in most probable direction as indicated by arrow in Figure 9.

If the three-quarter crown is prepared according to the technic described, there will be little tooth structure destroyed, and the operator is less liable to expose the pulp or endanger it by thermal shock than in preparing the average cavity. At the same time, it has an esthetic value that cannot be surpassed.

PRESCRIPTION WRITING IN DENTISTRY

By JACOB B. BAILIN,* B.S., Ph.G., New York City

I BELIEVE that we advance in our profession on pavement blocks which are cemented in that fixative called attention to detail. Success does not come to us at a stroke. It is built up by our being alert to the careful execution of the seemingly minor duties of our practice. Previous essayists before you have mentioned some of these details. I would like to add another: the prescription.

Prescription writing, today, in the dental profession is an art which is being sadly neglected. This charge I make in all humbleness as a dental student. I make it on my careful observation of prescriptions in pharmacies throughout this city, and on an article by Dr. Charles M. Proctor, which reads as follows:

Another method of which, I believe, we are neglectful is that of prescription writing. So many men are content simply to prescribe a proprietary article, when many times in the treatment of the diseases of the mouth, there

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ought to be a differentiation even in powders, pastes and washes demanding our careful consideration. We can readily see that with a little care and thought, a prescription carefully written is far more effective in the treatment of the diseases of which the patient is affected and will likewise elevate his respect for us when we are able to give him something more definite than a proprietary remedy.

Let me elaborate on Dr. Proctor's words. In the first place, dentists very seldom even prescribe proprietary remedies. The usual procedure is to advise the patient verbally to obtain the required remedy, usually a patent medicine, in the pharmacy and use it according to directions set on the bottle by the manufacturer. Most of you who have visited dental offices have undoubtedly noticed little prescription pads bearing the name of a widely advertised mouth wash or of a proprietary counter irritant. All the dental practitioner has to do in either case is to sign his name and presto! he has given the patient a prescription. I think that the presence of such pads in dental offices is an affront to our position among the healing professions. I cannot but feel that the proprietary remedy manufacturers are reflecting on the status of dentistry as a branch of medical science. Perhaps they are right in assuming that men who have graduated from college before us have not had the proper educational background for healing in a scientific and ethical manner. But let men answer for us who are now here that such is not our case. We have had a thorough pharmacologic education. We know the effects and possibilities of the drugs that we have studied. We have a rational background, in short, for making up our own minds as to the proper combination of drugs for an attainment of a certain remedial effect.

Why should we be so desirous of keeping the names of remedial agents from the common knowledge of the laity and why be so careful of prescribing a different prescription for every patient? In answer to the second question, let me say that every person, as you know, has a reaction to drugs different from that of every other person. A 5-grain dose of amidopyrin relieves postoperative pain in one patient and causes palpitation of the heart in another. So you see how important it is for us to judge carefully the possibilities of drugs and mixtures of them, how important it is for us to write a prescription carefully conceived for each individual case. Coming back to the first question, I would answer that the public should not, for its own welfare, be acquainted with names of remedial agents. Patients do not have a complete knowledge of the proper use of drugs. Your patient does not realize how close he is to narcotic addiction when he uses a barbituric acid preparation continuously for any minor pain. He becomes a public menace when he advises, harmlessly enough and with good intent, the use of this drug to other sufferers. The patient who continuously uses tincture of myrrh on the gums does not realize that the astringent action of the medicament is insidiously undermining the physiologic tone of the mucous membranes of the mouth and is laying them open to attack by such dangerous organisms as the Vincent spirochete. The public does not know the dangers of indiscriminate use of drugs, and it is our duty to see that it does not cause itself harm by using drugs of which we know the true value and scope.

Not only is it our duty to prescribe, but we must also prescribe in the proper manner. Our code of ethics orders us to prescribe in Latin, which is the manner handed down to us from the dawn of medical history. The physician writes the

order and method of compounding in such manner that only the pharmacist who is trained in the art of compounding can fill the prescription. This is just and within the limits of the ethics of medical practice.

I have outlined the reasons for the writing of the prescription from the ethical and the public health angle. I would add that the respect gained by dentists through such procedure is immeasurable. The patient realizes that he is being treated by a man educated in medical science. He is grateful for any relief which has come to him because of our knowledge—our own professional knowledge, not the ballyhoo of a proprietary medicine manufacturer. Nor should prescription writing be something which we feel that we cannot undertake because of lack of complete knowledge of the U. S. Pharmacopeia and National Formulary. After all, a mastery of the limited number of drugs which are required in our specialty can be easily attained. Do not be afraid to prescribe: for the advancement of our profession as a true part of the medical art, for the benefit of the patient and public and for our own advancement and success in our chosen profession.

THE VALUE OF BISMUTH-VIOLET IN THE TREATMENT OF VINCENT'S INFECTION AND DRY SOCKET: PRELIMINARY REPORT

By MALCOLM B. LACY, D.D.S., South Boston, Va.

THE medical and dental fraternities are always interested in any medicament which will destroy pathogenic organisms and at the same time prove to be of little or no toxicity to the body tissues.

Wilkinson and Barksdale[1] have demonstrated the bacteriacidal value of bismuth-violet (hexamethyltriamintriphenylcarbinolchlorid . . . bismuth) both *in vitro* and clinically. Their findings are best illustrated by the accompanying table taken from their article.

Sanders[2] has used the dye with much success in otorhinolaryngologic practice in more than 100 cases.

Because of its low toxicity and germicidal properties, in bismuth-violet we have an excellent preparation for use as a disinfectant of fields of operation in surgery and for the prevention and treatment of infection of wounds.

It is my purpose to give a brief report in this article of the use of the dye in dentistry, and more particularly in the treatment of Vincent's infection and dry socket.

1. Wilkinson, G. R., and Barsdale, I. S.: Effect of Bismuth-Violet on Certain Pathogenic Organisms, South. M. J., 21: 914 (Nov.) 1928. Barksdale, I. S.: Use of Bismuth-Violet in Prevention of Wound Infections, South. Med. & Surg., 91: (Sept.) 1929; Destruction of Common Pathogenic Bacteria with Bismuth-Violet, M. J. & Rec., 131: 631-632 (June 18) 1930.

2. Sanders, J. L.: Value of Bismuth-Violet Therapy in Otorhinolaryngological Practice, South. M. J., 23: 140 (Feb.) 1930.

EFFECT OF DILUTIONS OF BISMUTH VIOLET

Organism	Dilution							
	1 1,000	1 10,000	1 100,000	1 1 Million	1 10 Million	1 100 Million	1 1 Billion	Control
Staph. albus	No growth	No growth	No growth	No growth	No growth	No growth	No growth	Growth
Staph. aureus	No growth	No growth	No growth	No growth	No growth	No growth	No growth	Growth
B. typhosus	No growth	No growth	No growth	Growth	Growth	Growth	Growth	Growth
B. para. A	No growth	No growth	Growth	Growth	Growth	Growth	Growth	Growth
B. para. B	No growth	No growth	Growth	Growth	Growth	Growth	Growth	Growth
B. Coli	No growth	No growth	No growth	Growth	Growth	Growth	Growth	Growth
Strep. pyogenes	No growth	No growth	No growth	No growth	No growth	No growth	No growth	Growth
B. anthracis	No growth	No growth	No growth	Growth	Growth	Growth	Growth	Growth
B. pyocyaneus	Growth	Growth	Growth	Growth	Growth	Growth	Growth	Growth

VINCENT'S INFECTION

In Vincent's infection, the first procedure consists of drying the teeth and gums, using cotton rolls and air, and then treating the mouth in sections, three upper teeth and three lower. A cotton pellet is immersed in the bismuth-violet solution, and the teeth and gums are painted, care being taken to force the dye thoroughly into the interproximal spaces. The liquid is allowed to dry, which usually requires about a minute when air is applied. After the whole mouth has been gone over in this manner, as thorough instrumentation is employed as is possible at the first setting, the severity of the case being the governing factor. Besides the germicidal properties of bismuth-violet, it is a distinct aid in removing the tartar deposits, as the dye clings to the tartar, thus making it more clearly visible. After as thorough scaling of the teeth as possible, and after the bleeding of gums is checked, the teeth and gums are again taken in sections as before and dammed off with cotton rolls and dried. Once more, bismuth-violet is applied with cotton pellets as before and allowed to remain undisturbed for at least two minutes. Thereafter, the patient is dismissed and given sodium perborate to use as a mouth wash at least three times a day.

In severe cases, if there is extreme soreness and profuse bleeding when the gums are touched, only heavy deposits of calculus are removed at the first sitting. The treatment is repeated for three consecutive days and every other day thereafter until recovery is effected. The scaling, of course, is done more lightly each time, and is discontinued when all deposits have been removed. In advanced cases, from six to eight treatments suffice, and, in milder ones, three to four treatments.

I have used the preparation extensively during the past four months in what might be called an epidemic of Vincent's infection. A few case reports follow.

CASE 1.—A young man, aged about 21, had been treated in another city with iodin, mercurochrome and other preparations. His gums were very much inflamed, had a blue tinge and were very sore. A smear and microscopic examination made revealed Vincent's organisms. Treatment was carried out as described above. A smear was taken fifteen minutes after the second treatment, also two hours and twenty-four hours, respectively. Each succeeding smear showed fewer and fewer spirochetes. The patient was dismissed after the fifth treatment.

CASE 2.—A girl, aged 13, came in recently with a very advanced case of Vincent's infection. There was the characteristic soreness of the gums, loose teeth which were very sore and a marked odor to the breath. A smear was taken to confirm the diagnosis, after which treatment was carried out as described. Disappearance of the condition occurred after the fourth treatment and the patient was discharged.

CASE 3.—A boy, aged 18, had a very advanced case of Vincent's with ulceration of the soft palate. His gums were bleeding, sore, and swollen and the tissues were loose around necks of teeth. The patient was evidently quite toxic as he complained of feverishness and general ill feeling, which is quite concomitant with advanced cases. Treatment was as before in addition to the use of a laxative. The pronounced condition cleared up after the seventh treatment and the patient was discharged as having an arrested case.

DRY SOCKET

I have used bismuth-violet with very good results in the treatment of dry socket. At the first visit, a small piece of gauze is immersed in bismuth-violet solution, the excess of the liquid pressed out and the pledget inserted without pressure in the socket and allowed to remain for twenty-four hours. At the end of that time, it is removed, and the socket curetted. Another similar dressing is applied for a few minutes, after which it is removed. Usually, this treatment is sufficient to produce a rapid formation of granulations in the socket.

COMMENT

I have tried treatments recommended in various dental journals including phenol and tincture iodin, equal parts, neo-arsphenamin, locally, chromic acid and hydrogen peroxid, but since using bismuth-violet I have obtained quicker and better results. The technic is simple, the discomfort to the patient is less than when the acids are used and results obtained have been most gratifying.

CONCLUSIONS

1. Bismuth-violet, a triphenylmethane dye, has proved of value in the treatment of Vincent's infection.

2. Because of its specificity in the destruction of the common pathogenic organisms, bismuth-violet has been very effective in the treatment of dry socket.

3. The technic of treating these common infections encountered in dentistry is simple, the removal of infection is rapid and the patient is inconvenienced but little.

Further studies are in progress, the results of which will be published in future papers.

FOLLICULAR CYST ASSOCIATED WITH AN IMPACTED CUSPID IN AN INFANT: REPORT OF CASE*

By MENIFEE R. HOWARD, D.D.S., Denver, Colo.

The follicular cyst, often termed the dentigerous cyst, is benign and of congenital or developmental origin, usually occurring sometime during the eruption of the permanent teeth. Seldom, as in this case, does it occur during or previous to the eruption of deciduous teeth.

History.—F. B., aged 28 months and healthy, complained of pain and showed evidence of tenderness on the left side of the nose and cheek and under the eye. There was continuous lacrimation of the left eye, requiring constant wiping. This had been present for about one year, with swelling of the left nostril and over the left maxilla, thought to have been caused by either eye or nasal disturbance. After treatment for six months by a family physician, the patient was referred to a dentist who, on roentgen-ray examination, discovered an impacted upper left deciduous cuspid. About six months later, the patient was referred to me.

Examination.—There was distortion and elevation of the left maxillary and nasal bones, suggesting the possible presence of a tumor beneath. The eye was inflamed and watered constantly. The left nasal and maxillary areas were sensitive to touch. Slight swelling was evident in the upper left cuspid region, which was sensitive to touch. Roentgenograms revealed an impacted upper left deciduous cuspid with the crown pointing mesially, the remaining portion running straight distally. A cystic area surrounding the crown extended superiorly to the permanent tooth buds, mesially to the lateral incisor and distally to the first molar region, and occupied the enclosed area to the ridge.

Diagnosis.—Follicular cyst with impacted deciduous cuspid tooth was diagnosed. It seemed probable that the impacted cuspid, acting as a foreign body, stimulated cystic development. Hospitalization and surgery to remove growth and tooth were recommended.

Operation.—Under ether anesthesia, an intra-oral incision was made, March 9, over the impacted cuspid, extending anteriorly and posteriorly on the buccal surface. This tissue was retracted, exposing the impacted tooth and cyst, which were removed. A cheesy material apparently under pressure exuded from above the permanent tooth buds. This diffuse infection extended to the inferior border of the orbit and mesially to the nasal wall. The area was curetted and cleaned out, then packed with iodoform gauze saturated in camphor-phenol. The operating time was fifty-nine minutes. Microscopic examination of a slide, smeared with a bit of the cheesy material, revealed pneumococcus.

Postoperative Treatment.—Every two or three days, a part of the pack was removed. After a short time, plain gauze saturated with a 1:500 solution of acriflavin was substituted. This packing was changed and an infrared light was used at regular intervals over a period of two months.

Comment.—An impacted deciduous cuspid is rarely observed. The closing of the nasolacrimal duct, swelling over the maxillary region and nostril distortion which elevated the maxillary bone undoubtedly resulted from the intense pressure of the cyst and contents. Subsequent check up by dental roentgenograms showed no disturbance of the permanent tooth buds.

Results.—The lachrymal duct began to function within two weeks after the operation. The swelling slowly subsided and the patient was dismissed, June 4, a little less than three months after operation. Since that time, the parents have reported no recurrence of the previous condition. The boy, now 3 years and 3 months of age, is healthy and shows no facial disfigurement.

The dental roentgenograms taken before operation clearly outline the impacted cuspid within the cyst, but do not disclose the extensive destruction above the tooth buds. The film taken after operation discloses no apparent operative injury to the permanent tooth buds, represented by translucent areas above the deciduous teeth.

*Read before the American Society of Oral Surgeons and Exodontists, Evergreen, Colo., July, 1930.

TIC DOULOUREUX: REPORT OF A CASE*

By G. HAROLD COLE, D.D.S., Watertown, N. Y.

G. A. F., a physician in a nearby town, came in in the early part of July suffering extreme pain all over the right side of his head. He seemed to have all the symptoms of tic douloureux, which he thought might be caused by two decayed molars in the upper jaw, and he had come in to have these removed. Although from my experience and reading, I had little faith in the results of this procedure, I removed the teeth. No benefit resulted. The next day, a roentgenogram taken of the lower jaw revealed two rarefied areas in the edentulous portion. Experience with these rarefied areas suggested infection in an area that was not calcified as healthy bone is after the tooth has been removed several years.

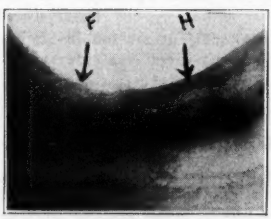
The patient was in such pain that he wanted me to try anything. Before operation, a culture was taken from the gum over the area to determine whether any infection was carried from the oral cavity into the bone. The inferior dental nerve was then blocked off, the periosteum laid back, and these areas chiseled into, a culture being taken from each area separately.

The first or control culture showed streptoccoci and gram-positive diplococci. Culture taken from area *F* showed *Streptococcus viridans* and gram-positive diplococci. Culture taken from area *H* showed *Staphylococcus aureus*.

The pain subsided immediately after the operation, and the patient was perfectly comfortable until the next morning, when he came in in the most excruciating pain. It seemed that the operation had been in vain, but on removal of the gauze from area *H*, the pain stopped.

Every morning for nearly a week, the patient came in with severe pain, which ceased immediately on removal of the gauze. After drainage was established, the symptoms of tic douloureux practically disappeared. He has now been perfectly comfortable for more than six weeks.

The culture taken from area *F* was so nearly like the control culture that it was probably contaminated from the oral cavity, but since the culture from area *H* was so different from the control culture or that from area *F*, it was probably not contaminated.



Lower right molar area. *F*, first molar. *H*, third molar.

Staphylococcus aureus is a germ capable of producing pressure, while *Streptococcus viridans* does not produce pressure, and it would seem that it was the pressure caused by *Staphylococcus aureus* on the inferior dental nerve that caused typical tic douloureux. Also, when the drainage gauze became soaked and stopped up the opening, there was a return of the pain.

I have never heard of tic douloureux being relieved otherwise than by alcohol injections or severing of the sensory nerve. I should be interested to know whether anyone else has had a similar experience.

344 Woolworth Building.

*Read before the American Society of Oral Surgeons and Exodontists, Evergreen, Colo., July, 1930.

The Journal of the American Dental Association

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C. N. JOHNSON, Editor

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Editorials

THE MEMPHIS MEETING

Each year, there comes to us the problem of preparing and putting on our great annual meeting. The amount of effort necessary for the consummation of this event cannot be realized except by those who are close to the activities during the entire year before the meeting, and particularly at the time the meeting takes place.

If the rank and file of our membership could visualize all of the effort that is expended in bringing our annual meetings to a successful issue, they would have greater respect for our routine achievement and greater appreciation for the sacrifices that must be made. The statement is frequently made that a few individuals do all the work, but this is not true of our own organization. It requires very many men and women to arrange for a meeting such as we hold each year, and those who are once committed to the task of assisting on any of the committees or commissions are

practically pledged to devote themselves whole-heartedly to their work till their allotted obligation is fulfilled.

The 1931 meeting developed much activity, most of it of a very constructive character. It goes without saying that the staging of the meeting by the Local Committee was beyond criticism. We heard none of the complaints that are prone to come from such a large and complex body of visitors as our meetings attract; which is concrete evidence that the arrangements had been as nearly perfect as possible. Great credit should be given to the efficient Local Committee who had exerted themselves to the utmost to see that the visitors were well cared for.

The President, Robert Todd Oliver, conducted the proceedings in an efficient manner, and much of the expedition with which the various sessions functioned was due to his prompt rulings and his orderly procedure. His military training stood him in good stead in emergency decisions, and the machinery moved very smoothly considering the many complicated problems that had to be solved. In a complex organization such as the American Dental Association, the wonder is that so little confusion occurs in our deliberations.

The Proceedings, when published, will reveal that many wise measures were enacted and much real progress was made. The necessity for economy, due to the general depression, caused a tightening up of expenditures in certain of the committees and commissions, and this will have a salutary effect on the organization as a whole. During the next year or two, there will be great need for the closest scrutiny of expenditures to the end that the long looked for return to prosperity will find our organization firmly entrenched financially, where it can function in an efficient manner in many of the worthy projects that are needed for future development.

The work of the Budget and Finance Committee should be commended in the highest terms. Their task is always a difficult one and at times it becomes actually oppressive. The fact that there is so little complaint directed against the findings of the Com-

mittee is proof positive of the inherent fairness and good judgment of the members.

The Board of Trustees met almost continuously, except during the other sessions, from the Saturday morning before the meeting till the close of the session Thursday night, and there was not an idle moment during their deliberations. In all, ten sessions of the Board were held. The volume of work enacted by the Trustees in the course of the year cannot be computed by the members generally, and when it is realized that no member of the Board is ever able to listen to a paper or see a clinic, the sacrifice on the part of the Trustees is seen to be very great.

The incoming Trustees held over from the previous term except in the First District, which was made vacant by the voluntary retirement of Frank T. Taylor of Boston. The District nominated Albert W. Crosby of New Haven in his place.

The new officers elected were: President, Martin Dewey; President-Elect, G. Walter Dittmar; Vice-Presidents, John J. Ogden, C. R. Lawrence, and Sterling V. Mead; Secretary, Harry B. Pinney (re-elected), and Treasurer, Roscoe H. Volland (re-elected).

Buffalo was selected as the next place of meeting, a decision giving general satisfaction. It is easy of access to the great volume of our membership, and the facilities are ample to take care of a record attendance. There was a tacit agreement that the Association would meet on the west Coast not later than 1934.

It now remains for the membership generally, and particularly the officers and the various commissions and committees, to begin active preparation for the 1932 meeting. The general expansion of our activities renders necessary the exercise of rare wisdom and much energy, to make the machinery move smoothly and effectively, and the time is not too long for the consummation of the best results. There is a patent obligation on the part of every chairman to see that his work is well formulated and thoroughly systematized in ample time, to the end that when the meeting of 1932 finally convenes, it will find everything in readiness for the best meeting ever yet held.

THE CHRISTMAS SEALS

Again the season is approaching for the annual distribution of the Christmas seals. The actual necessity for raising the Relief Fund becomes more apparent each year. In the natural order of things, a greater number of our members will need relief in the future than in the past. More men are growing old in the service every year, and the exigencies of our general economic insecurity are becoming more pronounced in recent times; which has resulted in many of our fine and conscientious professional men finding themselves in want at a period of their lives when they are the most helpless and the least able to care for themselves.

It should never be said of any of our faithful members that they are permitted to suffer neglect when incapacitated by age or illness. The record of the Relief Fund is ample demonstration of the generosity and good intent of our members, and through it there has developed a noble service that has brought comfort and happiness to many otherwise despairing souls.

The appeal that has already gone out from the Relief Committee should be heeded this year more than ever before because there is a greater need. But this one thing should be emphasized: No duplication of contribution is required on the part of any of our members. Some confusion has resulted from the fact that following a contribution on the part of some of our state officers and the buying of buttons for relief, the Christmas seals are sent out with the request that a dollar be remitted. The seals are sent to every member in the routine order, but it is by no means intended that a remittance be sent for the seals on the part of those who have contributed previously during the present year.

The Relief Committee graciously hope that they may receive a remittance to equal one dollar from each member of the Association, but they do not solicit duplication of contribution unless it comes voluntarily, as has been the case in many instances. They are grateful to the splendid men who year after year have sent their contribution and thus made possible the building of the fund

to a point where the interest is helping to support so many of our needy members.

After all, the sweetest solace in life comes not from the receipt of succor—necessary and comforting as this may be—but from the spontaneous generosity that impels a man to extend a helping hand to those less fortunate than he. To force a smile where before there had been despair, and to see the lines relax on a countenance that had been furrowed by care and want—this is near to being the greatest joy that comes to the lives of men. And there is no season of the year when giving seems more appropriate or natural than at Yuletide, when the soft glow of the domestic fireside warms the hearts and sympathies of the ones we love—the ones in want as well as the ones who have the wherewithal and the grace to give.

Let us spread the beneficent message of the seals to the four corners of this fair land of ours, and thereby reap a double benison —to the ones who receive and to the ones who give.

FRANK THOMAS BREENE, D.D.S., M.D.

(1866-1931)

Frank Thomas Breene was born Nov. 4, 1866, at Durant, Iowa, the son of George T. and Harriet Breene. He received his early education in the Wilton, Iowa High School, from which he graduated in 1884. He was graduated from the State University of Iowa College of Dentistry in 1888, with the Degree of D.D.S. In 1893, he received the Degree of M.D. from the University of Iowa, College of Medicine.

Dr. Breene was associated with the University of Iowa, College of Dentistry, from the time of his graduation until his death. Joining the staff of the college immediately after graduation, he was advanced continuously to positions of increased responsibility and was made Dean of the College in February, 1914, which position he filled to the time of his death.

He has been a prominent figure in the field of dental education, serving in many important organizations and holding responsible offices in them. He was president of the Dental Faculties Association of American Universities in 1917-1918. In 1920, he became a member of the Dental Educational Council of America, and he was reelected in 1930 for a new term as a representative from the American Association of Dental Schools. He was president of the American Association of Dental Schools and of the American College of Dentists, for the year 1930 and 1931. The meeting of the American College of Dentists, at which he would have presided, occurred only four days after his death.

FRANK THOMAS BREENE, D.D.S., M.D.
(1866-1931)

Dean Breene gave freely of his energies to all organizations interested in high ideals in dental education and practice. He was active in his state and local society work and was a past president of the Iowa State Dental Society.

He passed away on October 15, after an illness extending over several years.

A. W. BRYAN.

JAMES G. REID, D.D.S.

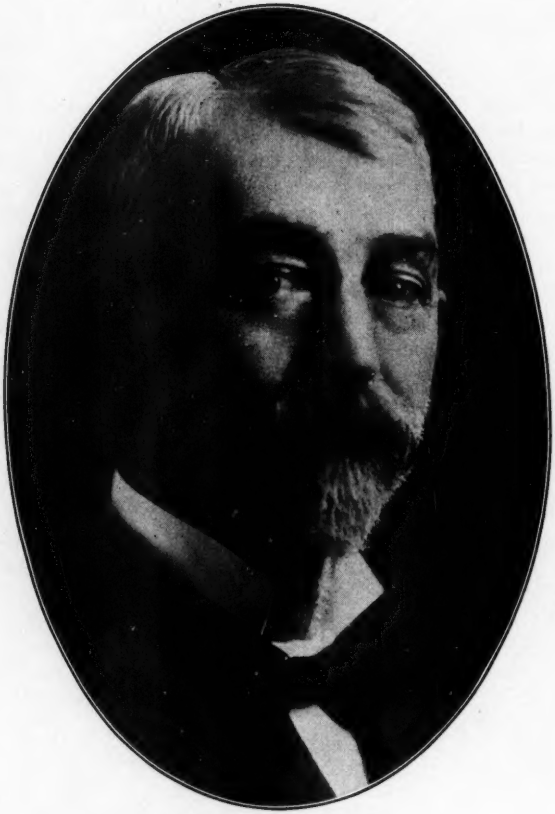
(1855-1931)

James G. Reid was born in Shelby County, Indiana, April 9, 1855; died, October 25, at his home in Chicago, of heart disease.

Dr. Reid was a graduate of the Ohio College of Dental Surgery, class of 1876. He came to Chicago shortly after his graduation and entered on the practice of his profession. He continued in active practice until a short time before his death.

The great variety of professional subjects on which Dr. Reid prepared papers was evidence of his versatility. The confidence and esteem in which he was held by his confrères was evidenced by the many offices bestowed on him by various dental organizations. He made his influence for good felt largely through his activities in connection with the Illinois State Board of Dental Examiners and the National Association of Dental Examiners; also as president of the Illinois State Dental Society in 1901 and in various positions on important committees of the state society; as president of the Chicago Dental Society in 1887-1888; on the board of directors of the Odontographic Society of Chicago, and as one of the earliest members of the Odontological Society of Chicago, an organization which he served as president at three different times. He was one of the five men who established and published the *Dental Review*. He was also a member of the Delta Sigma Delta Fraternity.

Dr. Reid is survived by his widow, who was Miss Elizabeth Manor of Shelbyville, Ind., a son, two daughters and several grandchildren.



JAMES G. REID, D.D.S.
(1855-1931)

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

The following articles have been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association for inclusion in the list of Accepted Dental Remedies. The Council desires dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules which govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary.*

MALTINE WITH COD LIVER OIL.—Maltine 70 per cent and cod-liver oil 30 per cent. Maltine is a preparation essentially similar to extract of malt, U.S.P., but it contains 3.88 per cent of alcohol and is prepared from malted barley, oats and wheat. As determined by a modification of the method of Chick and Roscoe, (*Biochem. J.*, 21, p. 689, 1927), it contains one unit per gram (28 units per ounce) of vitamin B_1, one unit being the weight of this product necessary as the sole source of B_1 in an otherwise adequate diet to protect growing rats from polyneuritis and to assure normal growth; and one-third unit per gram (9 units per ounce) of vitamin B_2, one unit being the weight of the product necessary as the sole source of B_2 in an otherwise adequate diet to protect growing rats from pellagra, and to assure normal growth. One gram converts 5 to 7 grams of starch to maltose and dextrin in thirty minutes at from 40 to 42 C. One hundred cubic centimeters of maltine with cod-liver oil contains not less than 28,000 fat-soluble vitamin A units as determined by the U. S. Pharmacopeia assay, and the product has an antirachitic potency such that 20 mg. fed daily to rachitic rats is sufficient to cause perceptible to distinct healing of rickets in from 6 to 10 days as determined by the line test.

Prepared by the Maltine Company, Brooklyn, N. Y. No U. S. patent. U. S. Trademark 44,566.

PROCAINE SOLUTION—ANESTUBES.—No. 0. Each cubic centimeter contains procain hydrochlorid, 0.02 gm. (One-third grain); chlorbutanol, 0.005 gm. (one-twelfth grain) in Ringer's solution.

Manufactured by Novocol Chemical Co., Brooklyn, N. Y. No U. S. patents or trademark for solution.

PROCAINE-EPINEPHRINE SOLUTION—ANESTUBES.—No. 1. Each cubic centimeter contains procain hydrochlorid, 0.02 gm. (one-third grain); chlorbutanol, 0.005 gm. (one-twelfth grain); epinephrin, 0.00005 gm. (one twelve-hundredth grain) in Ringer's solution.

No. 2. Each cubic centimeter contains procain hydrochlorid, 0.02 gm. (one-third grain); chlorbutanol, 0.005 gm. (one-twelfth

grain); epinephrin, 0.000021 gm. (one three-thousandths grain) in Ringer's solution.

No. 3. Each cubic centimeter contains procain hydrochlorid, 0.02 gm. (one-third grain); chlorbutanol, 0.005 gm. (one-twelfth grain); epinephrin, 0.000036 gm. (one eighteen-hundreth grain) in Ringer's solution.

Manufactured by Novocol Chemical Co., Brooklyn, N. Y. No U. S. patents or trademark for solutions.

(The Council desires to point out that acceptance of these dosage forms are on the basis of the composition and not on the basis of the package form. The preference for cartridges or ampuls is an individual affair and should rest on the experience of the individual dentist. The Council also desires to point out the desirability of conducting a series of tests to determine the advantages and disadvantages of freshly prepared solution, solutions in ampuls, or rubber stoppered cartridges, etc.)

PROCAINE-EPINEPHRINE BILLETS—NOVOL.—Each billet contains procain hydrochlorid, 0.01 gm. (one-sixth grain); epinephrin, 0.00015 gm. (one four-hundred-fortieth grain).

Manufactured by Novocol Chemical Company, Brooklyn, N. Y. No U. S. patents or trademark.

SILVER NITRATE APPLICATORS.—(Silver nitrate, 75%.) Wooden sticks, 2 inches (5 cm.) and 6 inches (15 cm.) long, tipped with a mixture of silver nitrate, 75 per cent, and potassium nitrate, 25 per cent; each stick to be used only once.

Prepared by Arzol Chemical Company, Nyack, N. Y. No U. S. patent or trademark.

SOMNOFORM—NOT ACCEPTABLE FOR A. D. R.

The Council has authorized publication of the following report.

SAMUEL M. GORDON, *Secretary.*

Somnoform is marketed by Stratford-Cookson Company, Philadelphia. According to advertising put out by the company, the composition is:

Chlorid of ethyl	83 per cent
Chlorid of methyl	16 per cent
Bromid of ethyl	1 per cent

Although Somnoform has been on the market for almost a quarter of a century, published reports present no proof that it is superior to ethyl chlorid alone, which makes up the larger proportion of the anesthetic. It is also asserted that "the record of Somnoform for safety is without equal." "If such is the case," Prof. Yandell Henderson, of Yale University, has recently written, "the record must be regarded as a pure piece of good fortune, for two at least of the ingredients of 'Somnoform' have a toxicity which renders them unfit for use as anesthetics. The poisonous character of methyl chloride has been sufficiently demonstrated by the refrigerator cases in Chicago. Although the amount of ethyl bromide in the mixture is small, there are general grounds for believing that the toxicity of the substance is high."[1]

1. Correspondence, J. A. M. A., 95:1445 (Nov. 8) 1930.

The so-called comparative studies of Dr. Rolland, the reputed discoverer, and the published reports on Somnoform must be interpreted in the light of the composition of the product at various times. When the Council on Pharmacy and Chemistry of the American Medical Association considered the product in 1919, Somnoform was said to be composed of chlorid of ethyl, 60 per cent; chlorid of methyl, 35 per cent, and bromid of ethyl, 5 per cent. Federal chemists found that it contained no bromid of ethyl (Notice of Judgment No. 571). Now it is claimed that 1 per cent of ethyl bromid is present. Hence, one studying the literature over a period of years is at a loss to interpret the results of anesthesia induced by Somnoform, in reference to the composition.

The present advertising booklet for Somnoform does not present acceptable evidence of its therapeutic value. An ignorance concerning the elementary facts of physiology and pharmacology is evident from the second statement. Having stated that "Somnoform is the result of years of comparative study and investigation of all anesthetics by Dr. George Rolland, Dean of the Bordeaux Dental School," the pamphlet continues: "He sought an anesthetic which would enter, dwell in, and leave the body in the same manner that oxygen does . . ." (Reports, Council on Pharmacy and Chemistry, A. M. A., 1919). The statement is repeated a decade later. Surely, the writer of the 1930 Somnoform pamphlet cannot be serious in including *"all anesthetics"* in Dr. Rolland's investigations, for the technic of ethylene for anesthesia in man was not announced by Luckhardt and his co-workers till about 1923.

The naiveté of the writers of the pamphlet in matters chemical is further illustrated by the following: "The peculiar manner in which the elements (of Somnoform) are combined is what makes Somnoform at once so efficient and safe."

The claim as to the value of the 1 per cent of ethyl bromid now said to be present in the mixture is highly improbable; and no evidence in support of the value claimed appears in the booklet.

No acceptable evidence is presented that the action of these drugs in Somnoform is on the whole essentially different from their actions when used singly, for it cannot be presumed that Somnoform is more than a mechanical mixture of all three of its components; two of which are known to be more harmful than ethyl chlorid alone.

The Council declares Somnoform inadmissible to A. D. R. because the absence of acceptable evidence of exceptional safety and value makes the claims unwarranted (Rule 6); because the name is not descriptive of its composition (Rule 8), and because it represents an irrational mixture of well-known products (Rule 10).

ABSORPTION OF DRUGS FROM THE TEETH

The following special article has been prepared as one in the series of articles to be published by the Council on subjects dealing with pharmacology and therapeutics as related to dentistry. The Council has authorized publication of this report.

SAMUEL M. GORDON, *Secretary.*

Despite the long empiric use of drugs in or around teeth, definite, objective evidence of their absorption is meager. Without this, our knowledge of drug action

remains incomplete, indefinite and uncertain. Dentists may not commonly attach significance to the possibilities involved here. Deep reflection suggests remote action of drugs resulting in unnecessary or undesirable effects on other organs, cumulative action, slow insidious poisoning of the system, altering effects on functions resulting in sensitization or allergy, effects on immunologic processes and various protective mechanisms, etc. A thorough knowledge of dental absorption might be of assistance in determining the nature and activity of dental tissue itself. The latter might be suggested from the behavior of the drugs, according to their nature and their physical and chemical properties. Answers to some of these questions are suggested in recent studies of Obiglio and Chaneles of the Physiological and Odontological Institute, Buenos Aires.

Previous investigators had demonstrated the absorption of potassium iodid, atropin, arsenic and chicken-cholera germs from the dental pulp. From 33 to 46 per cent of the arsenious oxid placed in the pulp chamber was recovered from the urine. Negative results were reported for mercuric chlorid, sodium salicylate, iodoform, strychnin, tetanus toxin and cobra venom. To these results may now be added the interesting results obtained with several important drugs and products studied by Obiglio and Chaneles.

Obiglio[1] used dogs in his researches. The animals were occasionally anesthetized with ether, but generally with chloralose, which maintains an efficient state of the blood circulation, a matter of first importance for satisfactory and critical results in studies of absorption. The teeth were drilled and the dental pulp was exposed without injury as nearly as possible. Then the drug was placed in the tooth in dry form or as a paste and the wound was covered with rubber and cement. The methods of determining absorption were unique, namely, by quantitative chemical analysis for the drug in body fluids and by typical pharmacologic responses.

The number and variety of drugs studied were considerable. For instance, after 76 mg. of potassium iodid was placed in one tooth, absorption was almost complete at the end of one hour, and iodid was demonstrated in the blood, saliva and urine. From 4 to 36 per cent of 20 mg. of phenolsulphonephthalein was absorbed and was found in the urine at the end of twenty-four hours. Apomorphin, in doses of 2 to 20 mg., inserted in the teeth under light ether anesthesia, caused vomiting in fifteen to thirty minutes. Strychnin (from 10 to 20 mg. in a tooth) caused convulsions in from forty to 130 minutes. Atropin (from 5 to 20 mg.) dilated the pupils and paralyzed the vagus nerves. Cocain in a dosage of 5 mg. caused symptoms, and 20 mg. caused death in less than one hour. Nicotin (from 10 to 20 mg.) caused prompt and typical symptoms of poisoning, and death in less than two hours.

The following drugs caused insignificant, doubtful or no symptoms and effects, and therefore were not appreciably absorbed: potassium cyanid (25 to 33 mg.), curare (10 to 20 mg.), snake venom (20 mg.), insulilin (10 units) on blood sugar, and epinephrin (10 mg.). A result of more than ordinary interest, but for which the Argentine dentist gives no explanation, was a sudden and moderately sustained increase in blood sugar after simple opening of the pulp chamber. Concerning dental

1. Obiglio, A. E.: Rev. Soc. argent. de biol., 6:79, 1930; abstr. Compt. rend. soc. de biol., 104:1022 (July 11) 1930.

absorption, the author concludes that this occurs promptly and easily from living healthy pulp, especially from that of young teeth. This holds true for crystalloidal and diffusible agents, but there is no or practically negligible absorption of heavy metals (except arsenic), substances of high molecular weight, toxins and animal poisons, colloids, vasoconstrictors and drugs easily destroyed. The low absorbability of toxins and venoms suggests the probable nonabsorbability of bacterial toxins, products of tissue degeneration in disease, etc., contrary to current assumptions. No results with amalgams containing mercury are reported, but it is to be hoped that the investigations of Obiglio may be continued and extended, not only on drugs and other agents, but also on conditions in the teeth and in the body which might affect the absorption process.

Equally interesting are the researches of Chaneles[2] on tooth destruction in chronic intoxication with fluorid given with food to rats. He confirmed the decalcifying action of fluorid reported previously by others, and, in addition, showed that the dental changes were much less marked in rats given fluorid and exposed to ultraviolet light. Treatment with sodium iodid, 2 mg., added to the fluorid diet daily, was without demonstrable beneficial effect on the decalcified teeth and on other organs and functions.[3]

2. Chaneles, J.: Compt. rend. soc. de biol., 102:860 (Dec. 13) 1929; Estudos Sobre el Fluor y la Fluorosis Experimental, Facultad de Ciencias Medicos, Buenos Aires, 1930, p. 145.
3. Chaneles, J.: Compt. rend. soc. de biol., 102:863 (Dec. 13) 1929.

BUREAU OF CHEMISTRY

MORE MISBRANDED DENTAL NOSTRUMS

FROM time to time, abstracts of Notices of Judgments issued by the Food and Drug Administration of the United States Department of Agriculture have been reported in the pages of THE JOURNAL that are devoted to the Bureau of Chemistry reports. The recent actions of the officials of the Department of Agriculture in examining dental products on the market for compliance with the Food and Drugs Act deserves the commendation of dentists. These actions of the Department of Agriculture are indicative of the protection to the purse and health of the public which may be expected of this branch of the Government if the officials in charge of the enforcement work are convinced of the stand of organized dentistry on unwarranted claims or curative properties made in connection with the sale of these products. In the last three years, the activities of the Administration in this direction have been greatly extended and it is not an idle conjecture to state that the activities of the dental profession as expressed through the reports of the Council on Dental Therapeutics and the A. D. A. Bureau of Chemistry have given the officials a feeling of confidence in investigating products put out with dental claims which are not permissible in the existing state of sound professional opinion.

In the perusal of these abstracts of Notices of Judgment, it should be recalled that the officials of the Food and Drug Administration are guided in their enforcement activities by legal limitations. The law limits the investigations of the department in this sphere to products which pass in interstate commerce and to statements made on the principal label or on circulars or other advertising material immediately surrounding the container.

Since publication of the last list of abstracts of Notices of Judgment many more have appeared, some of which are abstracted herewith:

F. E. I. SOLUTION

About July, 1929, the F. E. I. Corporation, Pittsburgh, Pa., shipped from Pennsylvania into Connecticut a quantity of F. E. I. Solution, which the Government declared was misbranded in violation of the Food and Drugs Act.

Analysis of the sample by Government chemists showed that F. E. I. Solution consisted essentially of boric acid, glycerin, a small amount of copper sulphate and water flavored with oil of cassia.

It was alleged that the article was misbranded in that the following statements regarding the curative and therapeutic effects of the article were false and fraudulent: "F-First E-eliminate I-infection . . . A Life Preserver for Teeth and Gums . . . Pyorrhea Specific . . .Pyorrhea is present in four out of five adults, causing loss of over fifty per cent of all permanent teeth. Dr. Ellis' F. E. I. Solution kills infection . . . A Scientific medicated gum and tooth wash for local application, destroying the infection causing Pyorrhea; ninety-five adults in every hundred have beginning Pyorrhea, with a loss of over 50 per cent of all permanent teeth. F. E. I.

Solution destroys this infection locally, the gums returning to a rosy, healthy color."

In March, 1930, judgment of condemnation and forfeiture was entered and the court ordered that the product be destroyed. (Notice of Judgment 17166, issued January, 1931.)

DR. ELLIS' F. E. I. TOOTH PASTE

The F. E. I. Corporation, Pittsburgh, Pa., shipped in August, 1929, from Pennsylvania into New York, a quantity of Dr. Ellis' F. E. I. Tooth Paste, which the Government charged was misbranded in violation of the Food and Drugs Act.

Analysis of a sample of the article by Government chemists showed that it consisted essentially of calcium carbonate, and a small amount of glycerin, flavored with oil of anise. The product was not antiseptic.

The Government alleged that the following statements regarding the curative and therapeutic effects of the article were false and fraudulent: "A Life Preserver for Teeth and Gums . . . Pyorrhea Specific to Prevent Infection of Pyorrhea, Rigg's Disease, Bleeding, Tender and Receding Gums . . . For preventing Pyorrhea; A Life Preserver for Teeth and Gums . . . Pyorrhea Specific . . . preventing tender, bleeding and receding Gums or Pyorrhea (Rigg's Disease); 'First Eliminate Infection.' This is the watchword, when tooth and gum troubles, such as are experienced by four out of five adults, show the ravages of infection known as Pyorrhea, or Tender, Bleeding, Irritated gums. Dr. Ellis' F. E. I. Tooth Paste . . . Keeps Gums Healthy. Pyorrhea, being an insiduous disease, destroys the gum tissue without pain or great discomfort. It may occur in late childhood, but is more frequent in adult life. Once the infection begins, Nature's first warning is a tenderness of the gums, which later become irritated and bleed easily when the teeth are brushed. This condition is followed by destruction of the gum tissue around the teeth, allowing the pus to become absorbed into the system, lowering the vitality of the entire body, and the gums to recede from their normal gum margin, as indicated by the uneven V's or ragged gum margin at the base of the teeth, while in the healthy gums the margin is even. This recession allows the enamel beneath the gum to become exposed, and owing to this portion of the enamel being more porous than the enamel above the normal gum margin, decay soon occurs. Dental and Medical Science agree that the mouth is the habitat for countless millions of germs, ready to attack the delicate gum tissue when broken or injured. Armed with this warning it is very imperative to fight against this ever present army, if you desire pearly white teeth to be set firm in healthy, rosy gums. To wage a victorious fight and destroy these germs, dentists and physicians combine in their opinion that the par-excellent dentifrice should be both cleansing and medicated. Sooner or later unless this infection is destroyed the peri-dental tissue holding the teeth in their sockets, becomes diseased and later destroyed, allowing the teeth to become loose and have to be extracted. Your dentist will tell you that very frequently he is called upon to treat a perfectly sound sooth that has become loose as the result of this infection destroying the peri-dental tissue. Only one course is open for him when this condition has been neglected—extraction. . . . Tartar . . . pushes the gum tissue away from the tooth, causing injury and irritation of the gums. The gums, being irritated, soon become infected owing to the presence of germs. . . . Dr. Ellis . . . perfected the present Dr. Ellis' F. E. I. Tooth Paste (First Eliminate Infection) to combat these millions of germs. . . . You are able to keep . . . the roots set firmly in healthy gums."

In January, 1930, the court ordered that the product be destroyed. (Notice of Judgment 17322, issued January, 1931.)

EPICOL

In January, 1929, Epicol Products Company, Minneapolis, Minn., shipped from Minnesota into Illinois a quantity of Epicol. Analysis of Epicol by Government chemists showed that it consisted essentially of sodium bicarbonate, sodium chlorid, saccharin, volatile oils, including oil of cassia, menthol and methyl salicylate, a trace of borax, alcohol and water. The product was not antiseptic. The Government charged Epicol was misbranded in violation of the Food and Drugs Act.

It was alleged that the following statements regarding the curative or therapeutic effects were false and fraudulent in that the said statements were applied to the article knowingly and in reckless and wanton disregard of their truth and falsity, so as to represent falsely and fraudulently to purchasers that the article was composed of or contained ingredients or medicinal agents

effective as a remedy for the diseases, ailments, and afflictions mentioned below:

"Healing Saline Solution . . . Pyorrhea . . . Spongy Bleeding Gums, Sore Throat, Tonsilitis, Nasal Catarrh, Bad Breath . . . Sore Throat, Tonsilitis—Gargle or spray throat with Epicol . . . Influenza, Grippe—A clean mouth, nose and throat is the best preventative. Gargle or spray with Epicol . . .Pyorrhea—Use Epicol daily, full strength . . . Hold in mouth for a few minutes, working it thoroughly between and around the teeth. Bad Breath—Use Epicol . . . full strength. . . . Nasal Catarrh—Dilute Epicol . . . spray nose regularly . . . Spongy, Bleeding Gums—Use Epicol; for Mouth, Nose, Throat . . . Healing . . . Physiological Salt Solution for Mouth, Nose, Throat . . . Epicol makes the gums firm and healthy, prevents receding. Soft, spongy, bleeding gums are the first indication of pyorrhea. . . . purifies . . . the breath. Heals and hardens gums irritated by new plates. Hastens the healing process, lessens the danger of infection following extractions. Poison from diseased gums and infected tonsils, absorbed by the system causes indigestion, stomach ulcers, stomach catarrh, nervousness. Mouth Cleanliness is vital to good health. Epicol tones and stimulates the tissues of the mouth to healthy activity. . . . purifies and disinfects the oral cavity . . . Relieves sore throat and tonsilitis when used as a gargle or in a spray. Prevents the ready formation of tartar; Epicol is the . . . antiseptic saline solution for . . . the mouth, nose and throat."

In April, 1930, judgment of condemnation and forfeiture was entered and the court ordered that the product be destroyed. (Notice of Judgment 17399, issued February, 1931.)[1]

MOSSO'S OIL OF SALT

In March, 1929, the C. A. Mosso Laboratories, Chicago, Ill., shipped into Minnesota a quantity of Mosso's Oil of Salt, which the Government charged was misbranded.

Analysis of the product showed that it consisted essentially of linseed oil, turpentine, camphor and phenol. The product possessed no germicidal properties and possessed only very weak antiseptic properties.

Misbranding was alleged in that the following statements in part were false and misleading: "Ideal Antiseptic, Use It in Place of Iodine; A valuable aid in the treatment of Pyorrhea, Alveolaris, Gingivitis and other diseases of the Mouth and Gums."

In July, 1930, the court ordered that the product be destroyed. (Notice of Judgment 17461, issued March, 1931.)

PYO-REM AND PYO-REM DENTAL CREAM

The Pyo-Rem Chemical Company, Inc., Los Angeles, Calif., shipped in March and May of 1930, from California into Colorado, packages of Pyo-Rem and Pyo-Rem Dental Cream, which the Government declares were misbranded. Analysis of samples by the Government chemists showed that Pyo-Rem consisted essentially of zinc chlorid, potassium chlorate and traces of boric acid, chloroform and formaldehyd, colored with a red dye; and that Pyo-Rem Dental Cream consisted essentially of calcium carbonate, soap, glycerin and traces of zinc chlorid and potassium chlorate, flavored with oil of peppermint.

It was alleged that statements regarding the curative and therapeutic effects of these products were false and fraudulent since the articles contained no ingredient or combination of ingredients capable of producing the effects claimed: "Pyorrhea, Alveolaris (Riggs' Disease), Tender, Bleeding, Soft, Spongy or Receding Gums; for Pyorrhea and other Mouth and Throat Disorders; A Real Tooth Saver . . . Pyo-Rem; Pyo-Rem Pyorrhea Remedy." On the circular accompanying Pyo-Rem Dental Cream appeared: "A Real Tooth Saver . . . it enables you to ward off Pyorrhea. . . . It also contains a small quantity of the essential ingredients of Liquid Pyo-Rem—just enough to prevent the appearance of Pyorrhea; If you have Pyorrhea, you need no longer despair for Liquid Pyo-Rem will banish the dreaded condition. We have knowledge of many cases where the teeth were so loosened as to almost be removed by the fingers, in which the gums were made healthy and the teeth solid as before. First have your dentist clean the teeth, removing all calculus. Then use . . . Liquid Pyo-Rem daily as a mouth wash to banish the condition. You will have no more Tender, Soft, Bleeding or Receding Gums."

Misbranding was also alleged in that the

1. Epicol is put out by the Epicol Products Company, Minneapolis, Minnesota, and was the subject of a report by the A.D.A. Bureau of Chemistry in July, 1929.

term "antiseptic" appearing on the carton and tube was false and misleading.

In August of 1930, judgments of condemnation and forfeiture were entered and the court ordered that the product be destroyed. (Notice of Judgment 17602, issued April, 1931.)

NO FAL

The Western Barber Supply Company of Tulsa, Okla., in May, 1930, shipped from Oklahoma into the State of Colorado a quantity of No Fal, which the Government declared was misbranded in that the statements made on the label regarding curative and therapeutic effects were false and fraudulent.

Analysis of the product by the department showed that No Fal consisted essentially of phenolic compounds, rosin, alkali and water.

It was alleged that the statements made regarding the curative and therapeutic effects were false and fraudulent since the article contained no ingredient or combination of ingredients capable of producing the effects claimed, viz.: "A scientific preparation for building healthy tissue and destroying wasted tissue. Heals Eczema, Tetter . . . Pyorrhea and all forms of irritation . . . Guaranteed —Will Grow Hair."

In September of 1930, notice of condemnation and forfeiture was entered and the court ordered that the product be destroyed. (Notice of Judgment 17637, issued April, 1931.)

MYGRONE

John Wyeth & Bro. (Inc.), Philadelphia, Pa., in July of 1930, shipped from Pennsylvania into the State of Illinois a quantity of Mygrone, which the Government declared was misbranded.

Anlysis of a sample by the Government chemists showed that the tablets contained amidopyrin and fillers.

The Government alleged in the libel that the article was misbranded because statements regarding its curative or therapeutic effects were false and fraudulent, since the quoted statements were applied to the article so as to represent falsely and fraudulently to purchasers, and to create in the minds of such purchasers, the belief that the article was composed of or contained ingredients or medicinal agents or combinations effective as a remedy for the diseases, ailments and afflictions mentioned: ". . . . Acute Fever, Asthma and Acute Rheumatism . . . ; Recommended highly in Migraine, Influenza, Asthma, Acute Fevers, Tabetic Pains, in the Headaches during attacks of Hay Fever, Toothache, etc. . . . It has been especially praised in Migraine, Neuralgia . . . ; . . . to relieve pain such as Toothache, Tabetic Pains."

In October of 1930, judgment of condemnation and forfeiture was entered and the court ordered that the product be destroyed. (Notice of Judgment 17780, issued June, 1931.)

BUREAU OF PUBLIC RELATIONS

BUREAU NAME CHANGED

As the result of action taken at the Memphis meeting, the Bureau of Dental Health Education has been changed to the Bureau of Public Relations. This action takes care of a much needed change, as the former title was frequently observed to seriously limit in the minds of many persons the scope of the activities which were being carried on in the Bureau. It is believed that the new name carries with it the immediate realization that the work of the Bureau embraces all the phases of contact that might exist between organized dentistry and the public, and it should tend to the consummation of many new contacts which have previously failed to develop or have been sidetracked.

Along with the action of changing the Bureau name, it is understood that new activities are to be developed in the Bureau, but these are at present not yet sufficiently outlined to permit of publication. Plans are being evolved, and when they are completed, the information will be forthcoming through these columns.

At this time, it might be well to recapitulate the activities which have been carried on. The Bureau

1. Develops friendly relations with other health agencies of a national, state and local character.

2. Acts in an advisory capacity to departments of health, health organizations and individuals interested in the development of mouth hygiene programs and clinical activities.

3. Collects and dispenses various types of data and information pertaining to dentistry, especially that dealing with dentistry in the field of public health.

4. Distributes dental health educational material in pamphlet and poster form.

5. Conducts a motion picture film and lantern slide rental service.

6. Furnishes material for various types of dental talks to lay audiences and assists and advises in the development of such talks including radio talks.

7. Prepares dental exhibits and has them available for national, state and local dental meetings as well as for various types of lay health shows.

8. Reviews any plans and outlines of proposed pamphlets and dental programs which are submitted to it.

9. Collects interesting articles for publication in THE JOURNAL of the Association in that section of THE JOURNAL allotted to the Bureau.

The Bureau is endeavoring in every way possible to bring about a better understanding of dentistry in the field of public health and a better understanding of public health in the field of dentistry.

It is hoped that the Bureau of Public Relations will be able to live up to its new name in every respect. It can do this if the members of the profession will

assist with suggestions, will use its service and will generously keep it informed at all times of new and interesting developments in their particular localities. The greater use that can be made of the Bureau's service means increasing justification for its existence.

GEORGE H. WANDEL, D.D.S.,
Supervisor,
Bureau of Public Relations.

MOUTH HYGIENE CONFERENCES AT THE MEMPHIS MEETING

By GEORGE H. WANDEL,* D.D.S., Chicago, Ill.

FOR some time, it has been apparent that there is a great need for those who are interested in the development of mouth hygiene activities to meet together to discuss this very important phase of dental endeavor. Efforts have been made from time to time to do this, but the results were not so satisfactory as they might have been. Last year at Denver, it was urged that a plan of meeting at the time of the convention in Memphis be devised. After considerable thought and study of conference methods used in other than dental organizations, the following plan was given a trial.

Monday afternoon of the Memphis meeting was selected for the first general "get-together" of all those interested in mouth hygiene activities. The meeting was held in one of the larger Section rooms. At this afternoon session, the discussion was directed in a general way toward problems dealing with two main types of activity: (1) the organization of a state dental program, and (2) the organization of a community dental program. The first named division occupied the first half of the afternoon and the last named the latter half of the afternoon.

*Supervisor of the Bureau of Public Relations of the American Dental Association.

PLAN OF PROCEDURE

1. Five or six persons who are at present directing state dental programs were called on to give an eight to ten minute résumé of the work they are carrying on, presenting principally the high lights in their programs. These speakers were selected on the basis of the dissimilarity of their programs and the talks were of an impromptu nature.

2. Immediately after each talk, a five-minute period was allowed during which the speaker submitted to cross-examination by the audience.

3. The same procedure was followed in the latter half of the program when directors of city, town and county dental programs presented their information.

The Monday afternoon conference was not the only one that was held, nor would it have been sufficient. There were so many points to consider that it was impossible to cover them all in one afternoon. Furthermore, the Monday afternoon conference was designed primarily for generalities on mouth hygiene program development and did not permit of a great amount of emphasis on specific problems. To take care of the demand for consideration of specific items, a new idea was put into effect. Three "breakfast conferences" were planned; that is,

all those who were interested were invited to meet at breakfast at 7:30 at the Elk Hotel. There, a private dining room was provided, and breakfast could be ordered from the same menu and at the same price as prevailed in the hotel grill. Breakfast was dispensed with as quickly as possible and there then remained at least an hour for the discussion of whatever problem had been assigned for that day.

At each of these breakfast conferences, a different topic was presented for round-table discussion. The topics selected were as follows: Tuesday, "Publicity and Propaganda"; Wednesday, "Financing a Dental Program"; Thursday, "The Preschool Dental Problem."

At the Tuesday conference, the group was given a real treat by E. R. Hays of Falls City, Nebr. Dr. Hays, a public health physician, is a member of the Nebraska State Medical Society and chairman of that society's very important public activities committee. Dr. Hays presented the plan of public education that is being conducted each year through the joint efforts of the Nebraska State Medical Society and the Nebraska State Dental Society during the period of the Nebraska State Fair. Space does not permit the description of this plan, but the manner in which it was received by those present was sufficient indication of its merits. Dr. Hays has consented to develop his material for early publication in THE JOURNAL, and it will be well worth the time of every member of the dental profession to read his article. The other two breakfast conferences were allowed to develop along the lines of round-table discussion on the subjects previously mentioned.

One of the last points of discussion by those in attendance was a possible group organization which might be perfected. It was finally decided that definite organization was unnecessary. It was agreed that the responsibility for the development of future conferences would be left in the hands of the Director of the Bureau of Public Relations, unless it should seem necessary at any time to make other arangements. As an aid in this work, an advisory committee was appointed for the coming year. This committee has four members, each selected to represent a certain group of mouth hygiene workers. The committee membership is as follows: N. Talley Ballou, of Virginia, representing the full time state dental directors; Harry Strusser, of New York, representing the community directors; Kenneth Gibson, of Michigan, representing philanthropic organizations, and F. L. Adams, of Florida, representing the chairman of state dental society mouth hygiene committees.

The attendance at the Monday afternoon conference and at all of the breakfast conferences surpassed expectations. The talks and discussions Monday afternoon were well presented and the interest shown was so keen that it frequently became necessary to "call time" in order to continue with the next speaker. The breakfast conferences were a success from the start. One of the most heartening experiences was the presence of many persons who had not previously attended meetings of this sort. They were from all parts of the country and assisted materially in bringing out interesting and valuable information in the discussions.

The expressions of appreciation for the conferences were numerous and the demands for their continuance at the Buffalo meeting were enthusiastic, sincere and unanimous. Numerous letters have since been received expressing appreciation and offering suggestions for the conduct of the meetings next year. Letters

have been received from persons who have heard of the meetings and who were disappointed that they had not been informed. This apparent oversight was not intentional in the least. Those who did attend came as the result of a letter that was sent out all over the country to persons whose names were linked up with state, local or institutional mouth hygiene activities. These letters explained the plans for the conferences and contained an invitation to attend. While numerous letters were sent out, there is no doubt that many such persons were overlooked. This is regretted, but was unavoidable because many names and adresses were not at the time available. *Anyone who did not receive an invitation and who is desirous of attending the proposed conferences to be held at the next meeting in Buffalo should send his name and adress to the Bureau of Public Relations, American Dental Association, 212 East Superior Street, Chicago, Ill.*

This article is written because of the very evident desire for knowledge on the part of many persons who are endeavoring to develop mouth hygiene programs in their respective states and communities, as well as the apparently universal feeling of appreciation evidenced by those in attendance for the information that they had been able to obtain. There was the fact also that the whole affair was dovetailed into the convention program in such a manner that it did not prevent attendance at the regular Section meetings which are always a part of the convention program; and that great possibilities were offered through this mode of getting together in eventually bringing all proponents of mouth hygiene programs closer together on the main points involved in carrying on mouth hygiene activities. By this statement, it is not meant that there is any intention at any time to steamroll into universal adoption the ideas or plans of any one person or group; rather, it should come about as a natural result of these conferences that certain plans and procedures shall be voluntarily accepted by the large majority as most efficient and effective. Finally, it seemed that a plan such as has been outlined could well be put into effect at the annual meeting of each state dental society, making it possible for mouth hygiene workers in the state to meet and discuss their individual problems. Out of such meetings will surely come a heartened and positive reaction for constructive state and national mouth hygiene activity.

OUTLINES FOR TEACHING ORAL HYGIENE FROM THE KINDERGARTEN TO THE EIGHTH GRADE*

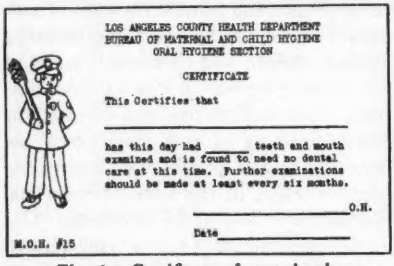
By EMMA P. DURBIN, R.N.,† Los Angeles, Calif.

"ORAL Hygiene," one of the younger children in the Public Health Family, like Topsy, "just growed" for several years, and she grew so fast and was so welcome in the family that few plans were made for her future. The time has now come to take stock and see that she develops more symmetrically.

All workers in this field of oral hygiene have felt a need for adequate lesson plans which will be so simple that they will be easy to follow, so definite that one can see before starting what one wishes to accomplish, and cumulative, so that, by the time a child has reached the upper grades, he not only has a knowledge of the subject of oral hygiene, but also actually practices what he has learned.

With these ideas in mind, the Los Angeles County Health Department has prepared and is using in the schools of this county the outlines herewith submitted. These plans will still need to be modified and changed from time to time, of course, as research brings out newer facts in dentistry and education.

It will be seen by these outlines that the same plans have been made to cover the work in the kindergartens and first grades, the teachers and hygienists making the adaptation.


LOS ANGELES COUNTY HEALTH DEPARTMENT
BUREAU OF MATERNAL AND CHILD HYGIENE
ORAL HYGIENE SECTION

CERTIFICATE

This Certifies that

_____

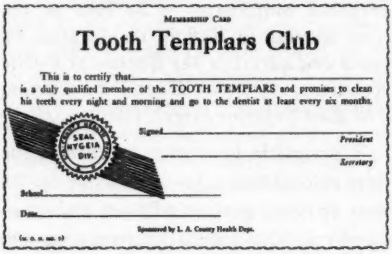
has this day had _____ teeth and mouth examined and is found to need no dental care at this time. Further examinations should be made at least every six months.

_____ O.H.

Date _____

M.O.H. #15

Fig. 1.—Certificate of examination.


Membership Card

Tooth Templars Club

This is to certify that _____

is a duly qualified member of the TOOTH TEMPLARS and promises to clean his teeth every night and morning and go to the dentist at least every six months.

Signed _____ President

_____ Secretary

School _____

Date _____

Sponsored by L. A. County Health Dept.

Fig. 2.—Membership card, Tooth Templars Club.

During the first semester of the school year, all efforts are concentrated on the children of these two grades. The dental hygienists, using portable equipment, go from school to school examining these children, giving the outlines to the teachers, distributing the monthly bulletins, giving classroom talks to start the program off well and holding group teachers' meetings so that all will understand what the objectives are.

The hygienist gives each child a certificate if at the time of the survey he is

*From the Los Angeles County Health Department, Bureau of Maternal and Child Hygiene (Section on Oral Hygiene).

†Chief, Oral Hygiene Section.

KINDERGARTEN AND FIRST GRADE: THEME OF SEMESTER: "BEING GOOD NEIGHBORS"*

Objectives	Methods, Materials, Projects	Teacher's Program
1. To have all dental defects corrected during September and October of this year.	1. Examination. List of defects sent to parents. A copy given to teacher. Attention called at this time to the first permanent molars.	1. Be present during examination and see condition of each child's mouth. To keep a copy of report and to urge children to go to dentist.
2. To interest children in keeping their teeth clean so they will be "good neighbors."	2. Toothbrush drill as sponsored by U. S. C. Dental College.	2. Work out theme "Good Neighbors." Have children bring small mirror (old ones from mother's purse). Teacher to supervise while each child inspects teeth to see if he will be a "Good Neighbor" that day.
3. To learn proper method of brushing teeth.	3. Type of brush demonstrated.	3. Talk to children about their friend, the dentist, who will help them.
4. To have own toothbrush and to brush teeth twice daily.	4. Instruction in care of brush.	4. Encourage daily brushing by having children make calendar filling in squares every day they brush teeth twice. Gold star each week.
5. To drink milk, eat vegetables, whole grains and fruits.	5. Stories: "Food Fairies"—National Dairy Council; "Milk Fairies"—National T. B. Assn.; Playlet: "How Milk Is Made"—National Dairy Council.	5. Playlet: "How Milk Is Made."
6. To go to dentist every six months for examination, prophylaxis and corrections if necessary.	6. "Thanksgiving basket" made up of fruits and vegetables, each one to have name of child when teeth are put in good repair; to be presented to P.T.A. at their November meeting. Try for 100 per cent.	6. Start Thanksgiving basket.
7. To take parents dental health bulletin first of each month, so they will understand the importance of home follow-up.	7. The health department to furnish dental health bulletin to be taken home by each child each month.	7. Send home mimeographed sheet with dental fact on it the first of each month.
		References: "Child's Book of the Teeth"—Ferguson; "Keep Well Stories for Little Folks"—Mary F. Jones, M. D., J. B. Lippincott Co.; "Healthy Living" II—C. E. A. Winslow; "Health Training in Schools"—Theresa Dansdill, National T.B. Assn.; "Hygiea" Magazine "Tag-a-long" stories.
	Measurement of Achievements: 1. Willingness of children to go to the dentist or hygienist. 2. The percentage of defects corrected. 3. The attitude toward eating proper food and toward other health habits.	

*Motivation secured through dental examination of grade.

GRADES 2, 3 AND 4.—ORAL HYGIENE OUTLINE*

Objectives	Methods, Materials, Projects	Teacher's Program
1. To have defects corrected.	1. Survey—Report to parent, teacher and nurse each child's needs.	1. Copy of survey which shows dental defects for each child.
2. To interest children in their teeth.	2. Toothbrush inspection and drill as outlined by U.S.C. Dental College.	2. Have children inspect teeth for cleanliness daily if possible, using small mirror.
3. To brush teeth in approved manner.	3. Talk on proper type of toothbrush and its care and dentifrices and when to brush teeth. Story: "The Brushes Quarrel"—C. E. A. Winslow.	3. Talk to parents and urge them to have deciduous teeth cared for, emphasizing importance of first permanent molars.
4. To have own toothbrush.	4. Learn about importance of the "baby" teeth and how long they should be kept.	4. Urge dental care by dentist.
5. To learn about first permanent molar and its need of special care.	5. The first permanent molar, when it comes in, why it is important, the need of going to dentist as soon as it erupts. (These children will have the first permanent molars.)	5. Inspect first permanent molars.
6. To strengthen muscles of mastication.	6. Foods which build strong teeth. Materials to use: food models. Allow child to select the foods which build good teeth and tell why. "Vegetable or fruit basket" (see Grade 1). Have vegetable market, store, etc. Read: poem by Winnifred Stuart Gibbs, "My Strong White Teeth." For Grades 3 and 4 have a weekly "Dental News Bulletin," children to record dental facts about themselves for the week. "I went to the dentist and had a tooth filled last Saturday." "I brushed my teeth both night and morning all week," etc. Illustrate, if possible. Recipe books: Child writing in his book a recipe for a tooth building food with a picture of what that food puts into the tooth structure. At end of school, he may take it home to mother. Let children suggest some dental project they would like to undertake. Children's question box.	References: Fones' "Report of Five Years Mouth Hygiene," Bridgeport, Conn., Board of Health; Ferguson's "Child's Book of the Teeth," "Keep Well Stories for Little Folks," J. B. Lippincott, p. 57-60; "The Pamphlets for Third Grade," "The Fate of the Six-Year-Molar," "Children's Teeth—A Community Responsibility," U. S. Public Health Service.
7. To have satisfaction in a clean mouth.		
8. To go to dentist every six months for examination and corrections.		

*Motivation: Survey of grade.

GRADES 5 AND 6.—APPROACH TO DENTAL HEALTH TRAINING THROUGH CHILD'S INTEREST AT THIS AGE

Objectives	Methods, Materials, Suggested Activities	Teacher's Part
1. To create a desire for good teeth which expresses itself in daily brushing carefully performed.	1. Dental survey—reports to teacher, parents and school nurse.	1. To study report of survey and urge children to have defects corrected.
2. To have the knowledge which is essential to obtaining and keeping good teeth.	2. Individual talk with child regarding his own defects and what he can do about them, as he is being examined, if time will permit.	2. To sponsor Tooth Templar Club.
3. To have understanding of foods which build good tooth structure.	3. Toothbrush drill led by pupil, if he has come from a grade where he has been properly instructed. Use applicators with cotton on end for brush.	3. To encourage children to score own mouths monthly.
4. To feel responsibility for teeth of younger children.	4. Classroom talk on diet.	4. Practice mouth hygiene herself so she will set good example.
	5. Organize Tooth Templar Club for 100 per cent children. Get teacher to sponsor it.	
	6. Dramatize "The Brushes Quarrel" —Winslow, for club meetings.	
	7. Morning individual inspection of teeth by pupil, using small mirror.	References: "Child's Book of the Teeth"—Ferguson. "The New Healthy Living"—Winslow, Chap. IX, p. 79. "Good Teeth, How to Get Them and Keep Them"—Met. Life Leaflet. "Health Habits" Book II. "Pediodontia," Floyd Eddy Hogeboom. Read "Hygiea" and "Health News" from L.A. Co. T.B. and Health Ass'n.
	Units of Work: Use dissected tooth for study with chalk talk on structure; have cards on which children grade themselves each month. 100: perfect mouth. 10 deducted for unbrushed teeth 3 deducted for teeth needing prophylaxis. 3 deducted for sore gums. 3 deducted for cavities. 2 added for every tooth which has been filled.	
	Slogans "Every child needs every tooth." "Let your book of health contain vegetable leaves." "Lettuce find health along the milky way." "Don't be afraid to bathe, you won't shrink." "Buy your color from the vegetable man." "A toothbrush in time will save many a dime."—Students of St. Paul High School.	

GRADES 7 AND 8

Objectives	Methods and Suggested Activities	Teacher's Part
1. To prevent crippling of the dental arch. 2. To improve the masticating machine. 3. To decrease focal infection from diseased teeth. 4. To promote mental alertness by better mouth hygiene. 5. To promote the esthetic appearance of the face. 6. To develop a feeling of responsibility for mouth hygiene in younger children. 7. To graduate from eighth grade with no dental defects.	1. Dental survey—Individual talks as the teeth are examined. Review best methods of home care of the mouth. Instruction on foods: those which build good tooth and bony structures: milk, green vegetables, fruit, whole grain cereal, eggs, cheese, and meats; the "self-cleansing foods," such as raw cabbage, celery, lettuce, apples, and hard toast. 2. Study history of mouth hygiene. Don Quixote said: "I had rather they had torn off an arm, provided it were not the sword arm, for thou must know, Sancho, that a mouth without teeth is like a mill without a stone, and that a diamond is not so precious as a tooth." 3. Tooth Templar Club, aiming for 100 per cent membership. Stress fact that boys and girls will secure more lasting friends and advancement, if their teeth are well cared for. The responsibility of teaching others the value of good teeth. Units of Work: Write original plays and songs on oral hygiene; evaluate own teeth; scoring monthly. 100: perfect mouth. 10 deducted for unbrushed teeth. 3 deducted for teeth needing prophylaxis. 3 deducted for sore gums. 3 deducted for cavities. 2 added for every tooth which has been filled. Study chart of "Development of Teeth"—M. S. Proctor, Story Bldg., Los Angeles.	1. Urge corrections. 2. Sponsor club. 3. Practice mouth hygiene herself so she will set good example. References: "Hygiea"—American Medial Ass'n. "Good Teeth, How to Get them and Keep Them"—Met. Life Leaflet. (free) "Health News"—L.A. Co. T.B. and Health Ass'n.

found to need no dental work. (Fig. 1.)

Feeling that parents need to know more about the importance of children's teeth, if one is to secure their cooperation, a monthly bulletin containing just one dental fact was given each child in the kindergartens and first grades to take home. By the end of the school year, all the basic facts about oral hygiene had been covered. Encouraging response has been received from the distribution of these bulletins.

OCTOBER

To Parents:

A clean mouth with no cavities is one of the greatest helps toward securing good health for your child.

"Baby teeth," of which there are twenty, are tremendously important to a child. Each one has a special work to perform, and some of them should be retained in the mouth till 12 or 13 years of age. They should always be filled or otherwise cared for, if there are any cavities. Has your child been to the dentist recently?

Los Angeles County Health Department.

NOVEMBER

To Parents:

Has your child his first permanent molars yet? If not, watch for them. Count between the central front teeth back to number 6. These are the first permanent molars. They usually appear between the fifth and seventh year. They are *permanent* teeth and should be examined by a dentist very soon after they appear as the enamel is often faulty, small pits or cracks resulting in which the food packs, causing decay to start quickly. These four first permanent molars are the "anchors" which hold the shape of the jaw while the "baby teeth" are changing to the permanent ones. The early loss of even *one* first permanent molar may cause much damage to the dental arch.

Los Angeles County Health Department.

DECEMBER

To Parents:

It is an excellent health habit for a child to learn to chew the harder foods thoroughly after he has all of his "baby teeth." Raw carrots, celery or other vegetables, hard toast and apples furnish exercise for the muscles of the jaws and also help to broaden the dental arch.

Los Angeles County Health Department.

JANUARY

To Parents:

Does your child have a *small* toothbrush with bristles set far apart so they will penetrate *between* the teeth when used? This also makes it easy to keep the brush clean. Rinse the brush thoroughly with cold water and sprinkle with a little salt and hang in the sunshine, if possible, after using. Once a week, wash well with soap.

Los Angeles County Health Department.

FEBRUARY

To Parents:

Does your child brush his teeth in the following manner, and do you supervise the evening brushing when he is apt to be sleepy?

1. Brush the upper and lower teeth separately.
2. Brush down on the upper teeth and gums and up on the lower teeth and gums.
3. Apply pressure to the brush so the bristles will penetrate between the teeth.
4. Use a good sweep of the brush from high up and low down in the cheek folds to the edges of the teeth.
5. Brush the roof of the mouth at the same time as brushing the inside of the upper teeth.
6. Brush each area, at least eight to ten times, at each brushing.
   (*a*) Begin on the upper right side, brushing down, proceeding around the arch on the outside, then on the inside surfaces from the left.
   (*b*) Continue on the lower right, brushing up, going around the outside, then on the left inside around the mouth.

(*c*) On the chewing surfaces, begin with the upper right, then the lower right, change to the upper left and finish with the lower left.

Brush morning and night.

LOS ANGELES COUNTY HEALTH DEPARTMENT.

MARCH

To Parents:

Each child should go to the dentist at least every six months for supervision and to have his teeth cleaned. Tiny defects can then be corrected without pain and at very little expense.

LOS ANGELES COUNTY HEALTH DEPARTMENT.

APRIL

To Parents:

Milk assists greatly in building good teeth. Every growing child should have at least 1 quart of milk daily in some form.

LOS ANGELES COUNTY HEALTH DEPARTMENT.

MAY

To Parents:

Every *good* tooth an adult has is worth $1,000, the dentists say. We should have *thirty-two*. This would be a valuable heritage for you to give your child and would be possible in the majority of cases, if proper care and supervision are given in the early years of childhood. Help your child to have a full set of good teeth. Start today!

LOS ANGELES COUNTY HEALTH DEPARTMENT.

JUNE

To Parents:

The last month of school is here. What has been the dental record of these ten months for your child? Has he brushed his teeth every night and morning and visited his dentist *twice* during the year? If not, will you try to make an appointment for him the first week of vacation, so that both of you may have a happier and healthier summer? Dental advice will be gladly given to any parent. See the dentist or hygienist in your district.

LOS ANGELES COUNTY HEALTH DEPARTMENT.

The outlines for the second, third and fourth grades bring out more work for the child to do and more detail. These outlines are given to teachers of these grades on the hygienist's first visit to school, so that the work will be started early.

In the fifth and sixth grades, the children will be interested in club work, and through the club can be made to feel responsibility for younger children. They can begin to score themselves dentally, so that they can note improvement as to mouth conditions from month to month. The outlines are given to teachers soon after school opens.

By the time the children have reached the seventh and eighth grades, they should know all the important facts about mouth hygiene, including tooth building foods. They should be able to give a comprehensive talk before the club or younger children, demonstrating accepted methods of using the toothbrush; to be interested in reading regularly such magazines as *Hygiea,* published by the American Medical Association, and local information in *Health News,* published by the Los Angeles County Health Department and the Los Angeles County Tuberculosis and Health Association; or others of like nature, in order to get a

OUTLINES FOR TEACHING ORAL HYGIENE IN GRAMMAR SCHOOLS—ALL GRADES

In all grades, it will be necessary before making a definite plan for any oral hygiene work to find out what the regular program is to be in that particular grade. The hygienist will endeavor to fit her program to the work being carried out by the teacher. All teaching must be *positive,* not *negative.*

Motivation

(*a*) This is to be secured by (1) survey of room with slips sent to parents telling of conditions of mouth; (2) hanging a large mirror in which the children may look at their teeth each morning as they pass to seats.

General Objectives

1. To conserve and promote dental health in children.
2. To create a desire for good teeth which expresses itself in daily brushing cheerfully performed.
3. To create a willingness to go to dentist for needed corrections.
4. To state dental health facts in *positive* terms.
5. To present the facts which are essential to obtaining and preserving good teeth.
6. To approach dental health teaching through the child's interests at the age of group receiving instructions.

Specific Objectives

1. To create satisfaction in having a clean healthy mouth.
2. To promote the understanding that sound teeth help with the digestion of food.
3. To prevent crippling of the dental arch.
4. To decrease focal infection from diseased teeth.
5. To assure a diet rich in tooth building materials.
6. To strengthen the muscles of the jaw.
7. To promote mental alertness.
8. To promote the esthetic appearance of the face.
9. To create an interest in the dental health of others.

Projects

1. Posters and essays.
2. Individual toothbrushing charts or calendars made and kept by children in lower grades.
3. Oral hygiene stories and plays.
4. Bulletin kept by children in room on their daily dental health activities.
5. Tally lines drawn on board for every child whose teeth are in good repair. (Let child make own mark and write name.)
6. Milk, food, and vegetable projects using milk bottles, grocery store and vegetable markets and food models.
7. Fruit or vegetable basket. (Each child who needs no dental work makes paper fruit or vegetable with his name on it. Others added as dental work is completed. When school is 100 per cent, present basket to principal.)
8. Competition between various rooms in a school.
9. Membership drives for Tooth Templars clubs.
10. Competition between the boys and girls for clean teeth using two pictures, one of a boy brushing teeth and one of a girl. If more boys than girls have brushed their teeth, the picture of the boy is hung for the day and vice versa.
11. Mirror inspection each morning by the children themselves, using a tiny mirror that each one has, which he places in the desk after use.
12. Food recipe books, using healthful foods and closing book with several well balanced meals.
13. Visit to health center to learn more about general health.
14. Articles read in "Health News" published by Los Angeles County Tuberculosis and Health Association.
15. Correlation with activities program being carried out by school.

16. Score Card. Have children in older grades evaluate own dental conditions, using score card as follows:

PERSONAL ORAL HYGIENE SCORE CARD

100: Perfect mouth
10 deducted for unbrushed teeth
3 deducted for teeth needing prophylaxis (cleaning)
3 deducted for sore gums
3 deducted for cavities
2 added for every tooth having been filled

well-rounded picture of public health as a whole.

For those schools that feel they are unable to carry a complete program as outlined, the following general suggestions have been compiled with the hope they may save much time and effort on the part of the various teachers.

While the hygienists were busy with the smaller children, the other grades were not idle. The outlines for each grade were given to the various teachers and principals, and the program was explained. In many instances, especially where there had been Tooth Templars clubs previously, the children themselves, with the help of interested teachers and nurses, reorganized the work without waiting for examination by the hygienist. They either went to their own dentist for this or carefully evaluated their own dental needs, with the understanding that, if they were later found to have dental defects, they would lose their membership in the club until the needed work was done. In other words, they were members on probation until they could prove their right to be initiated. Thus, the health programs and meetings were not held up awaiting the coming of the ever-welcome hygienists.

Only those without dental defects may belong to the Tooth Templars Club. A pledge is taken that members will brush their teeth twice each day and go to the dentist at least every six months. After an elaborate initiation service, they are given a button and membership card.

PRESCHOOL PROGRAM

No account of the oral hygiene preventive program would be complete were mention not made of the preschool and prenatal work.

In the eighty-three child hygiene conferences being conducted by the Los Angeles County Health Department, it is the policy to refer all babies of one year or over to the district health center dentist or dental hygienist for a mouth examination and oral hygiene instruction to the mother. These children are placed on a follow-up list and are recalled every four to six months for further supervision. No actual dental work is done, unless the medical social service division finds the parents financially unable to have a private dentist. A beautiful "First birthday" dental card is given to the mother to keep in her baby book. A diagram on this card shows the number and condition of teeth present when examined.

It is most gratifying to find, in making a survey of the kindergartens now, that many of these children are starting school having no dental defects.

The health department is conducting a metabolic clinic in the East Side Health and Welfare Center to which all prospective mothers from the prenatal con-

ferences of this district are referred for a basal metabolism test. It is thus hoped that, if there is any endocrine imbalance, it may be corrected before trouble is caused to the developing tooth structure and other normal growth of the child. In the regular conferences, these women are educated in all matters which will prepare the prospective mother for a normal delivery and help her to have a fine healthy baby.

Thus, while working with the school child, the other part of the great program of preventive dentistry is not being neglected by the Los Angeles County Health Department. The goal is "A clean healthy mouth for every child in the county."

CURRENT LITERATURE

EXTRACTS AND ABSTRACTS

Procain Dermatitis: Bart M. James (*J. A. M. A.*, Aug. 15, 1931) reports a case of procain dermatitis and attempts to determine the chemical groups responsible for the irritating effect of the drug. A woman, aged 38, had been suffering continually for six months from a severe dermatitis of both eyelids and the adjacent portion of the cheeks and nose. The condition had been ascribed to various causes, and all treatment had been of little benefit. The skin of both eyelids was markedly swollen, edematous and a dusky red. The eruption was in an unusual location for a dermatitis due to an external cause and it was only by persistent questioning of the patient and by the use of the patch test with various substances (pollens with which she came in contact, products of bacteria from the nasal secretion, the tortoise shell of which her eyeglasses were made and the cosmetics she used, including rouge, mascara, lemon bleach, face powder, eau de quinin hair tonic and Elizabeth Arden face creams, and eye drops prescribed by an ophthalmologist four years previously, and designated by him as "harmless") that the cause of the condition could be found. All tests were negative except that with the eye drops, and inquiry at the drug store where the prescription was filled disclosed that the prescription called for 1 per cent procain and boric acid in distilled water. Discontinuation of the eye drops and use of a bland ointment and light roentgen-ray treatment resulted in a cure. Tests with various substances related to procain and with other local anesthetics, in an attempt to link the chemical constitution of a certain group of related substances with their idiosyncrasiogenic effects on the hypersensitive skin, gave no definite basis for conclusions.

Are Biopsies on Malignant Tumors Dangerous?: Epstein and Fedorejeff (*Arch. f. klin. Chir.*, May 15, 1931) point out that occasionally there are reports about injurious results of biopsies. The complications that may result from a biopsy are infection, hemorrhage or more rapid growth of the tumor. However, there is no report that indicates the percentage of these cases to the total number of biopsies. For this reason, the authors made careful observations on a large number of patients in whom biopsy had been done in the oncologic institute in Leningrad and also reviewed the literature on the complications resulting from biopsy. On the basis of these studies they reach the following conclusions: 1. Complications following carefully performed biopsies are exceptional. 2. Sarcomas seem to react to a biopsy with accelerated growth more often than cancers. 3. In order to avoid complications following biopsies, a radical operation, electrocoagulation or chemical cauterization should follow immediately. Irradiations may be begun before the biopsy, and, following it, they should be either resumed immediately or discontinued 4. In cases of nonulcerated tumors that are covered with normal skin, regional lymph nodes that appear to be involved may be totally extirpated. 5. If such lymph nodes are not present, or in the case of the mucous membranes, the biopsy should be done with the diathermy loop. 6. In tumors of the breast, biopsy as an independent intervention should

be avoided. As the first step in an extensive intervention, it is sometimes advisable. In these cases, the biopsy specimen should be examined immediately by means of the freezing microtome and after that either the breast should be amputated or the intervention should be terminated. 7. Tumors in the form of small nodules (tongue, lips, and so on) should, for the purpose of biopsy, be removed totally within healthy tissue.—Abstr. J. A. M. A., Aug. 22, 1931.

Anesthetic Emergencies: The successful treatment of anesthetic emergencies depends on their anticipation. Edward Tate (*Cur. Res. Anes. Anal.,* May-June, 1931) classifies these emergencies as (1) minor difficulties; (2) respiratory disturbances, and (3) circulatory disturbances. Cocain is used as a local anesthetic in the majority of cases, but occasionally there is a hypersensitiveness to the drug, evidenced by toxic symptoms. Guttman suggests that 3 grains of luminal be given half an hour before the cocain, as it acts as a complete prophylactic against the toxicity and also as an efficient preoperative sedative. Nervousness and fright can be overcome by a quiet talk with the patient before induction. With children, anesthetization should be rapidly accomplished, a little scent being used preceding ethyl chlorid, and thus unconsciousness obtained without dread or fear. All patients should be warned against taking too deep and rapid breaths, as this cuts down the natural oxygen supply. Hypodermic injection of atropin half an hour before induction reduces the amount of secretion and a mechanical prop can be used to keep the airways open. Respiratory disturbances may be due to (1) some mechanical obstruction to the respiration, or (2) interference with the respiratory center itself. Failure to correct these conditions may lead to asphyxia. Any variation in the regular automatic respirations of the third stage of anesthesia should be immediately investigated. The color of the mucous membrane and of lips and ear lobes is an index to the condition as regards possible asphyxia. Muscular rigidity is much more frequently due to obstructed respiration than to a too light anesthesia. Laryngeal stridor, produced by a tonic contraction of the adductor muscles of the vocal cords, often due to some reflex stimulus, is a condition which it is difficult to overcome. The temptation is to deepen the anesthesia in the hope that the symptoms will disappear. A gentle flow of oxygen may overcome the condition, but the only certain method of avoiding or overcoming laryngeal spasm is the use of the intratracheal catheter. Obstruction due to foreign bodies or formation of a membrane requires tracheotomy. Smoker's cough can be avoided by spraying the throat with a 10 per cent solution of cocain. The position of the patient is important in anesthesia. Nitrous oxid-oxygen, ethyl chlorid and ether may be given in the sitting position, but chloroform or any mixtures containing it should never be given in this position. Excessive flexion of the head causes the base of the tongue to fall against the back of the pharynx and excessive extension deprives the larynx of the protection provided it by the epiglottis. The main causes of respiratory disturbances due to interference with the respiratory center itself are: (1) toxicity due to an overdose of anesthetic or overpremedication (hyoscin or morphin); (2) anemia of the respiratory center due to fall of blood pressure, deficient power of the blood or injury to the respiratory center, and (3) reflex inhibition of the respiratory center due to surgical shock in a partially anesthetized patient or due to rough handling of viscera, etc. Artificial respiration, oxygenation, hypodermic injection of lobelin, one-twentieth grain, reflex stimulation by alternate applications of heat and cold to the skin and mustard packs over the heart are indicated. Circulatory or heart complications may be produced by (1) an overdose of anesthetic, (2) shock, hemorrhage, entry of air into a vein or the detachment of a thrombus; (3) asphyxia, throwing an excessive pressure on the heart muscle, and (4) paralysis of the respiratory center. The patient's head should be lowered and artificial respiration instituted at once, hot towels being applied on the precordium. If there is no response, 1 c.c. epinephrin may be injected directly into the heart muscle. Heart massage is the only remaining measure to be taken. The commonest causes of shock are partial obstruction of the airway, overdose of anesthetic, prolonged or excessive hemorrhage, excessive stimuli from surgical measures and low body temperature. The chief symptoms are general apathy, reduced sensibility, muscular weakness, pallor, small rapid pulse, irregular gasping respirations and subnormal temperature. What is known as primary shock is due to disturbance of the vasomotor centers, secondary shock being of toxic origin. The latter is the more serious condition, calling for atten-

tion to the oxygen supply, first of all, intravenous injection of physiologic sodium chlorid solution, with 6 per cent gum arabic added, and, if necessary, transfusion. Rest, quiet and warmth are essential. Drugs such as camphor in oil or strophanthin may be used as a cardiac stimulant. The majority of anesthetic difficulties and emergencies are, fortunately, respiratory in origin. In closing, the author quotes from *St. Bartholomew's Hospital Gazette:* "Take care of the airway and inquests will take care of themselves."

Cancer of Mouth and Lips: Martin (*Radiology,* June, 1931) believes that cancer of the mouth and of the lower lip, in early stages, does not frequently metastasize. For clinical convenience, all cases of cancer of the lower lip are roughly classified under three stages. In the first stage are grouped all cases in which the lesions are confined to the superficial tissues; that is, to the mucocutaneous structures proper. The second stage includes all lesions that have become more extensive, with the induration and ulceration more pronounced and the subcutaneous structures involved without evidence of invasion of the lymph nodes. In the third stage are included all cases in which the lesions are extensive and in which the lymph nodes show unmistakable evidence of metastasis. In 119 cases of cancer of the lower lip treated by roentgen rays, 86 were in the first stage, 22 in the second and 11 in the third stage. In the first and second stages, there were 108 patients who did not show evidence of metastases at the time of treatment. Later, four patients developed malignant nodes in the neck and died. The remaining 104 patients (or 96.3 per cent of the patients in the first and second tages) were well after five years. The eleven patients in the third stage had definite lymph node involvement at the time treatment was begun. All the patients in this stage died from cancer. It is the author's experience that early malignant lesions inside the mouth respond remarkably well to small amounts of radium in platinum needles implanted in the tissues. Interstitial radiation inside the mouth is augmented by highly filtered radium packs and roentgen rays applied externally. Mouth hygiene is an important factor in the successful conduct of this class of cases. In incurable cancer of the mouth and lips, the patient can often be greatly benefited by radiation therapy, while in some cases life can be prolonged for months.—Abstr. *J. A. M. A.*

MISCELLANY

BOOK REVIEW

Metallurgy for Dental Students. By Kenneth W. Ray, Ph.D., Associate in Metallurgy, Department of Chemistry, University of Iowa. With 105 illustrations; 209 pages; price $3.00. Published by P. Blakiston's Son & Co., Inc., Philadelphia.

Much of the material of this book has been gathered from Bureau of Standards methods as outlined in papers in THE JOURNAL, and therefore the research on the various materials is as nearly up-to-date as it is possible to make it.

The subject of waxes, impression compounds and investments, while not strictly metallurgy, falls within the purview of dental practice to such an extent that it seems logical to include it in this volume, particularly when it is closely connected with metals and alloys. Amalgams also come in for quite an extended study, followed by nonmetallic cements and fillings.

One of the features that will be found of especial service to the student is the inclusion of questions and answers at the end of each chapter, a matter of great convenience in review work. Much useful information may be had from this volume, and it is a pleasure to commend it. The publishers have turned out their usual excellent mechanical product.

CORRESPONDENCE

PROCAIN DERMATITIS FOLLOWED BY WARTS; IRRITATION FROM ANTISEPTICS

To the Editor: During my days as a dental student, it was impressed on me over and over again that it is impossible to sterilize the mouth for longer than a fraction of a second. Yet I was instructed clinically to mop an intra-oral site with an antiseptic before injecting. Quite illogical, I thought; but I was only an undergraduate. In obtaining an anesthesia in the early days of my practice, I used an all-glass syringe, a plati-

num iridium slip on needle, and procain tablets in Ringer's solution. Invariably, the site of injection was painted with a solution of aconite, iodin and glycerin. There was an occasional sloughing and mild inflammation, but they were rare. Incidentally, I developed procain dermatitis and suffered miserably.

Then the cartridge type of syringe was received, and what a blessing it proved for me. No more dermatitis. The condition, however, left its stigma (I believe), for my hands became literally littered with warts. The physician and dermatologist could not rid me of those warts by any means. They recurred in other areas. I kept changing soaps in an effort to find a remedy, and after using a certain soap, the warts disappeared in one week, and in six years there has been no recurrence.

Coming back to the main point: When I began using the new syringe, I ceased using topical applications before any injections. The cartridge-type syringe was used exclusively and the needle was always flamed. The remains in a carpule were never used for another patient. The result was this: In more than 22,000 injections, not a single case of sloughing or inflammation occurred. For the past few years I have again been using an application of aconite, iodin and glycerin in equal parts and have seen several cases of irritation.

ROBERT H. BROTMAN, D.D.S.
2135 W. North Ave.
Baltimore, Md.

"THE POSSIBLE SOLUTION OF A DOUBLE PROBLEM"*

To the Editor: It does not seem possible that after 100 years of dental effort in the United States of America, only 20 per cent of the population are receiving adequate dental attention. Neither does it seem credible that only 7 per cent of the children under 8 years of age have received suitable dental treatment, yet these statements have been made for thirty years, and, to my knowledge, no one has questioned their truthfulness, so I must agree with the statement in the first part of your editorial.

The free dental clinics which have been organized in some of the densely populated areas have given relief to a large number of deserving children. It is very commendable that we have public spirited citizens who have given of their substance to establish these institutions. A great deal of energy has been expended by some members of the dental profession and by laymen on some agency that would assist in taking care of the mouth health of the children of this city. However, these institutions, until they can be multiplied tenfold, will be only public educators, helping the people to understand the benefits of filling teeth and oral hygiene.

Your thought in regards to "idle hours" is a most excellent one, and no doubt, as a national movement, we could secure 10,000 dentists who would devote two hours a week, or one hundred hours a year, to the treatment of the worthy public. I should like to suggest that this contribution of time be restricted to treating children under 10 years of age. How does the use of the following blank appeal to the dentist of general impulses and a desire to do a lasting service to the deserving child?

I am a member of the Philadelphia Mouth Hygiene Association and am willing to treat one or two children each week if referred to me by one or my patients, or by the Association. This child must be less than 10 years of age and be presented at my office during hours agreeable to me.

Name of child.....

Name of patient recommending child .....

Address of child.....

Address of patient.....

It has been my privilege within the last three years to treat 100 children a year who have been sent to my office from the day nurseries.

THEODORE D. CASTO
1831 Chestnut Street
Philadelphia, Pa.

BENEFACTORS

The convention of Northern Indiana dentists that closed here Tuesday afternoon reminded us of the contribution the men of this profession are making to the better health and appearance of the people. One need not be very old to remember when bad teeth were expected as one of the necessary evils.

*Editorial, J.A.D.A., 18:2207 (Nov.) 1932.

If people in the thirties did not have unsightly gaps in their teeth rows, especially if they lived in the country out of range of dentists, they were considered favored of the gods. By the time the twenties were past people expected artificial teeth. Toothache and the dreaded abscessed root or "beeled tooth" were the banes of childhood.

Today thousands of children and young men and young women in every city have never felt the twinge of toothache. They practice dental and oral hygiene every day and by visiting dentists at intervals make certain they will lose no teeth or run into any of the serious difficulties that have their origin in the mouth.

In addition to making us a healthier and a sightlier people the dentists have made such progress in jaw surgery that many of their repair jobs following automobile accidents compare with the jaw repairs made during and after the war.

Unfortunately to many persons inspection and care of teeth are expenses that can be omitted during hard times, so they neglect their own and their children's teeth. This is one reason why school dental inspection is important just now.

We lead the world in oral hygiene and surgery. Our dentists set the example for Europe and most of the dentistry for the nobility and royalty of foreign lands is done by Americans.

One of the most useful professions in the world, dentistry is feeling its share of the depression, for not only do people fail to keep up their dental work but they neglect their bills. But care of the teeth, like antituberculosis work, is a preventive and a national safeguard. We speak for the staunch support of school dental inspection and ways and means of seeing that the needy children get to the dentists for the work that will help prepare them for the future.—Reprinted.

NEWS

Deaths

Bean, L. G., Columbus, Ohio; Western Reserve University, School of Dentistry, 1912; died October 16, after a long illness; aged 58. Dr. Bean was selected in 1929 by the department of health and the Ohio Dental Association as head of the newly organized department of dental hygiene. His task of preparing the state for its new responsibility had been completed and a definite program formulated when illness intervened. The work as planned by Dr. Bean will be carried out, as he had only recently completed outlining methods for putting the dental health program into operation.

Loeffler, Egbert T., Detroit, Mich.; University of Michigan, College of Dentistry, 1888; died August 16, after a long illness; aged 71.

Meakin, Fred. W., Salt Lake City, Utah; Philadelphia Dental College, 1903; died November 16, from injuries suffered in a fall at his home the previous day; aged 53. Dr. Meakin was a past president of the Utah State Dental Society.

Neff, Will R., Chicago, Ill.; Chicago College of Dental Surgery, 1899; died October 31, of heart disease; aged 57.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association, Buffalo, N. Y., September 12-16.

American Dental Society of Europe, Baden-Baden, Germany, August.

Chicago Dental Society, January 18-21.

Dental Clinic Club of Philadelphia, February 16-19.

Dental Protective Association, Chicago, Ill., December 21.

Four State Postgraduate Clinic, Washington, D. C., March 29-31.

Greater New York, New York City, November 30-December 4.

Kings County Dental Society of Brooklyn, N. Y., February 25-27.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

Southern Society of Orthodontists, Cincinati, Ohio, December 1-3.

*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

St. Louis (Mo.) Dental Society, December 7-9.

STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

December

Ohio, at Cincinnati (1-3).

February

Minnesota, at St. Paul (24-26).

March

Connecticut, at New Haven (March 30-April 1).

April

Michigan, at Detroit (11-13).
New Jersey, at Atlantic City (13-15).

May

Maryland, at Baltimore (2-3).
New York, at Albany (11-13).
Virginia and West Virginia, at Winchester, Va. (16-18).

June

Colorado, at Estes Park (20-22).

STATE BOARD OF DENTAL EXAMINERS

California, at San Francisco, December 14. Bert Boyd, Secretary, 610 South Broadway, Los Angeles.

Colorado, at Denver, December 1. Zenas T. Roberts, Secretary, 810 Metropolitan Bldg., Denver.

Delaware, at Wilmington, January 20-21. W. S. P. Combs, Secretary, Middletown.

Iowa, at Iowa City, December 14. H. F. Pool, Secretary, Mason City.

Minnesota, at Minneapolis, December 11-19. Walter H. Smith, Secretary, 2337 Central Ave., Minneapolis.

New Jersey, at Trenton, December 7-12. John C. Forsyth, Secretary, 148 W. State St., Trenton.

Pennsylvania, at Philadelphia and Pittsburgh, December 9-12. W. A. McCready, Secretary, 115 Highland Bldg., Pittsburgh.

Rhode Island, at Providence, December 1-3. Albert L. Midgley, Secretary, 1108 Union Trust Bldg., Providence.

Texas, at Houston, December 1-4. A. L. Nygard, Secretary, 1232 Medical Arts Bldg., Dallas.

Wisconsin, at Milwaukee, December 14-18. S. F. Donovan, Secretary, Tomah.

AMERICAN DENTAL SOCIETY OF EUROPE

The next annual meeting of the American Dental Society of Europe will take place in August, 1932, in Baden-Baden, Germany.

DAWSON BUCKLEY, *Secretary*
25 Blvd. Victor Hugo
Nice, France

CONNECTICUT STATE DENTAL ASSOCIATION

The sixty-eighth annual meeting of the Connecticut State Dental Association will be held in the Troup Junior High School, New Haven, March 30-April 1.

C. W. VIVIAN, *Secretary*
New Britain

SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY

The next meeting of the Society for the Advancement of General Anesthesia in Dentistry will be held December 14, at 160 W. 59th St., New York City. Elmer H. Brown, D.D.S., Trenton, N. J., will talk on "The Psychic Approach to Induction of a Smooth General Anesthesia." Membership in the society is open to all ethical practitioners. Meetings are held in October, December, February and April, with dinner at 7 and the scientific session at 8 p. m.

LEONARD MORVAY, *Secretary*
76 Clinton Ave.
Newark, N. J.

DELAWARE STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Delaware Board of Dental Examiners will be held in the Municipal Bldg., 10th and King Sts., Wilmington, January 20-21, 9 a. m. to 5 p. m. For further information, address

W. S. P. COMBS, *Secretary*,
Middletown

CHICAGO DENTAL SOCIETY MIDWINTER MEETING

The Chicago Dental Society Midwinter Clinic will be held at the Stevens Hotel, January 18-21. The Program Committee announces that all phases of dentistry will be covered in the various section meetings. Tuesday evening, the Midnight Show will be given, and Wednesday evening the annual banquet and dance will be held. The com-

mercial exhibition will constitute an unusually fine display of dental equipment and supplies, affording an opportunity to view the advances and improvements developed by the more than 125 exhibiting organizations.

All members of the American Dental Association are cordially invited to attend this meeting.

CHARLES R. BAKER, *President*

DENTAL CLINIC CLUB OF PHILADELPHIA ANNUAL FEBRUARY CLINIC

The annual February Clinics of the Dental Clinic Club of Philadelphia this year will consist of a course in oral surgery, exodontia, anesthesia and radiography only. The course begins February 16, at 9 a. m., and will continue until 5 p. m. February 19. The lecturers and clinicians include Robert H. Ivy, Lawrence Curtis, L. Biddle Duffield, George C. Davis, John H. Gunter, Roy M. Ennis, James E. Aiguier, W. J. Asprey, D. C. Turkington and Mugur Hagopian. The fee for the course is $25.00. Membership is limited. Send reservations accompanied by check at an early date to John H. Yearick, 4548 Wayne Avenue, Philadelphia, Pa.

THE COLORADO STATE DENTAL ASSOCIATION

The forty-ninth annual meeting of the Colorado State Dental Association will be held at the Stanley Hotel, Estes Park, June 20-22.

JOSEPH G. EWERS, *Secretary*
Republic Bldg.,
Denver

THE NEW JERSEY STATE DENTAL SOCIETY

The sixty-second annual meeting of the New Jersey State Dental Society will be held in the Hotel Chelsea, Atlantic City, April 13-15. For information on exhibits, address Earl L. D. Hester, 34 East Palisade Ave., Englewood; on clinics, E. J. H. Schneider, 806 Clinton Ave., Newark. For general information, address

F. K. HEAZELTON, *Secretary*
223 East Hanover St.
Trenton

FOUR STATE POSTGRADUATE CLINIC

The D. C. Dental Society acting as host to the neighboring states of Maryland, Virginia and West Virginia, will give a three-day clinic, March 29, 30, 31, at the Mayflower Hotel in Washington, D. C.

A. D. WEAKLEY, *Chairman*
1029 Vermont Avenue
Washington, D. C.

VIRGINIA-WEST VIRGINIA JOINT MEETING

The next annual meeting of the Virginia State Dental Association and the West Virginia State Dental Society will be held jointly at Winchester, Va., May 16-18. Members of the American Dental Association are cordially invited to attend.

R. B. SNAPP, *General Chairman*
Winchester, Va.

PER CAPITA SUBSCRIPTION OF STATES TO RELIEF FUND

Following is the per capita subscription to the Relief Fund from each State for 1930-1931:

Alabama	$0.66	Nevada	$0.25
Arizona	1.99	New Hampshire	1.00
Arkansas	.22	New Jersey	.80
California	.37	New Mexico	1.04
Colorado	.54	New York	1.09
Connecticut	.91	North Carolina	.23
Delaware	1.18	North Dakota	.49
Washington, D. C.	.83	U. S. Navy	.20
Florida	.39	Ohio	.46
Foreign	2.00	Oklahoma	.33
Georgia	.82	Oregon	.45
Idaho	.46	Pennsylvania	.57
Illinois	.46	U. S. Public Health	.23
Indiana	.44	Philippine Islands	.67
Iowa	.48	Porto Rico	.18
Hawaii	.27	Rhode Island	.47
Kansas	.47	South Carolina	.41
Kentucky	.27	South Dakota	.35
Louisiana	.30	So. California	.49
Maine	.41	Tennessee	.29
Maryland	.48	Texas	.68
Massachusetts	.59	Utah	.50
Michigan	.40	Vermont	.40
Minnesota	.40	Virginia	.40
Mississippi	.21	Washington	.42
Missouri	.66	West Virginia	.35
Montana	.42	Wisconsin	.48
Nebraska	.49	Wyoming	.49

Put Away a Coin a Day for the Relief Fund

Little Mickey Fosset, the 5-year-old son of a Memphis dentist, took one hundred pennies from his bank and contributed them to the Relief Fund.

He is going to put away a cent every day until the Buffalo Meeting and contribute them also.

What an example this 5-year-old is setting us! Put away a coin, not necessarily a cent, every day for the next year for the Fund. What a glorious addition we can make to the Fund if we all do this!

Make it retroactive, too: send in a coin for every day of the past year so that this year we may exceed all previous ones.

There are dentists who are in need. This money will help keep someone from the poor-house.

The Dental Relief Fund Committee

EDWARD G. LINK
WILLIAM T. CHAMBERS
OLIN KIRKLAND
FRED R. ADAMS, *Secretary*
R. OTTOLENGUI, *Chairman*

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1931-1932

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Why the Germicidal Dentifrice Was Originated

MECHANICAL cleansing agents for the teeth had been in use a number of years before Prof. Miller in 1881 gave the first scientific explanation of the relation of oral bacteria to tooth decay. Miller's investigations demonstrated that mouth bacteria, by means of acid produced from fermenting food particles on and between the teeth, attack the teeth causing tooth decay. This attack is particularly successful when resistance of the teeth is lowered by improper diet, disease or other underlying causes.

Recognizing the significance of Miller's work in the advancement of oral hygiene, Dr. N. S. Jenkins, an American dentist practicing in Europe, began his study to develop an agent that would not only cleanse the teeth but would destroy the bacteria that inhabited the mouth. Dr. Jenkins, working in cooperation with Prof. Miller, continued his experiments until 1908 when the final results of his efforts were confirmed by one of the leading research laboratories in the United States.

In announcing the KOLYNOS Dental Cream formula, which was the result of his investigation, before the annual meeting of the American Dental Society of Europe, Dr. Jenkins said:

"The problem of cleaning the teeth was comparatively simple; the two indispensable ingredients are precipitated chalk and a refined soap. I will not weary you by recounting the long process by which I came to the final selection of the disinfectants.

"You will observe that each of these ingredients, except chalk, has a distinct antiseptic or disinfectant value, but it was in their combination that I found disinfectant power such as I had hoped for, but until my experiments were ended, had scarcely dared to anticipate. This preparation (KOLYNOS) will cleanse and polish the surfaces of the teeth without the least danger of abrasion. It will overcome the defenses of bacteria and destroy the germs. It will produce a condition of true cleanliness in the entire mouth."

Therefore, one of the chief purposes of KOLYNOS Dental Cream, through its daily use by the patient, is to keep the activities of the oral bacteria in check between visits to the dentist.

May we send you a professional package? The coupon below is for your convenience.

28c

THE KOLYNOS COMPANY
New Haven, Connecticut

Kindly send me a professional package of Kolynos Dental Cream.

*Name*_____

*Street Address*_____

*City*_____

COLGATE'S keeps teeth clean

and this is Colgate's only claim

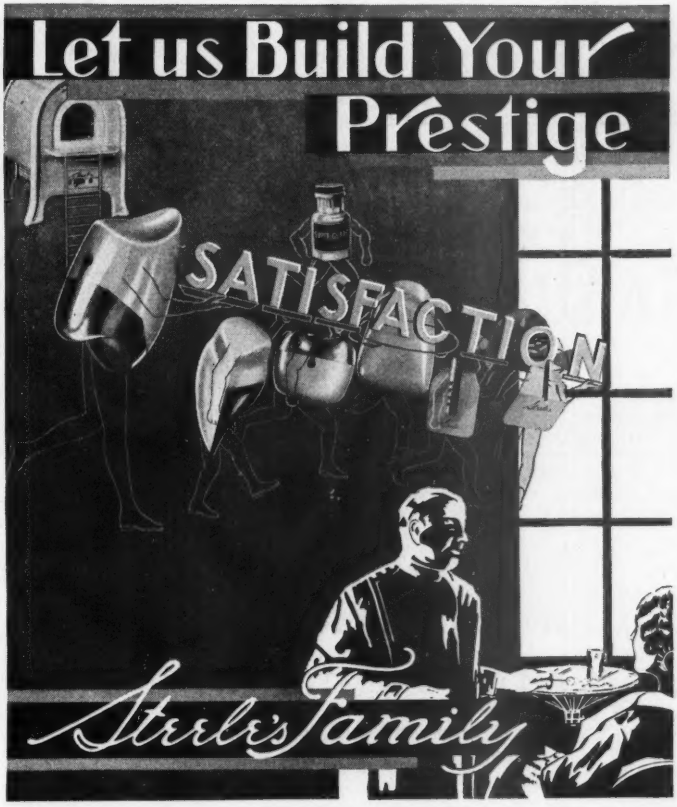
In the midst of extravagant and gilded toothpaste claims, Colgate's has always contended that the function of a toothpaste is *not* to do the work of the dentist—*but to keep teeth clean*—and that Colgate's *does* clean teeth effectively and safely.

This is one reason why more dentists have recommended Colgate's through the years than any other kind of toothpaste.

We are grateful to the dentists of America for their fine cooperation, more evident today than ever before. And in return, Colgate's pledges to keep faith with the dental profession—to guard zealously the quality of its toothpaste, so that it will always merit such fine recognition.

The seal signifies that the composition of the product has been submitted to the Council and that the claims have been found acceptable to the Council.

COLGATE'S RIBBON DENTAL CREAM



Stronger

More Esthetic

More Hygienic

Interchangeable

When you use Steele's products you are using the finest. Reference to this advertisement with your name and address will bring you a complete Technic Book. No obligations to you.

— **WRITE** —

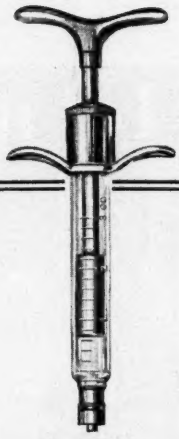
THE COLUMBUS DENTAL MFG. CO., Columbus, Ohio, U.S.A.

No. 3 SL

No. 3 SL—Sana-Lok Syringe with resistance glass barrel, non-corrosive metal plunger and metal tip needle locking device.

No. 3 LP

No. 3 LP—The Luer-Lok Posner Syringe with resistance glass barrel and plunger and metal tip needle locking device.



No. 3 SLD

No. 3 SLD—Sana-Lok Dental Syringe recommended by Dr. Winter. Has resistance glass barrel, non-corrosive metal plunger and metal tip needle locking device.

Three Exceptional Syringes for the Dental Surgeon

If you desire literature on any of these syringes, kindly fill out and mail the coupon.

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B-D PRODUCTS

Made for the Profession

Makers of Luer-Lok and Sana-Lok Syringes, Asepto Syringes, **B-D** *Water Syringes, Dental Needles, Chip Blowers, Blood Pressure Instruments, and* **B-D** *Thermometers.*

BECTON, DICKINSON & CO., Rutherford, N. J.
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Please send literature on Luer-Lok and Sana-Lok Dental Syringes.

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CERTAINLY I WANT TO SAVE A DOLLAR

$6.00 VALUE 5

4 Powders, 2 Liquids, and a bottle of Copr-Zinc for added germicidal efficiency . . that's the big Six Dollar Cement value now obtainable for $5.00.

More than 50 years experience in making Cement is in back of this new and popular package now obtainable at your Dealer's.

THE L. D. CAULK CO.

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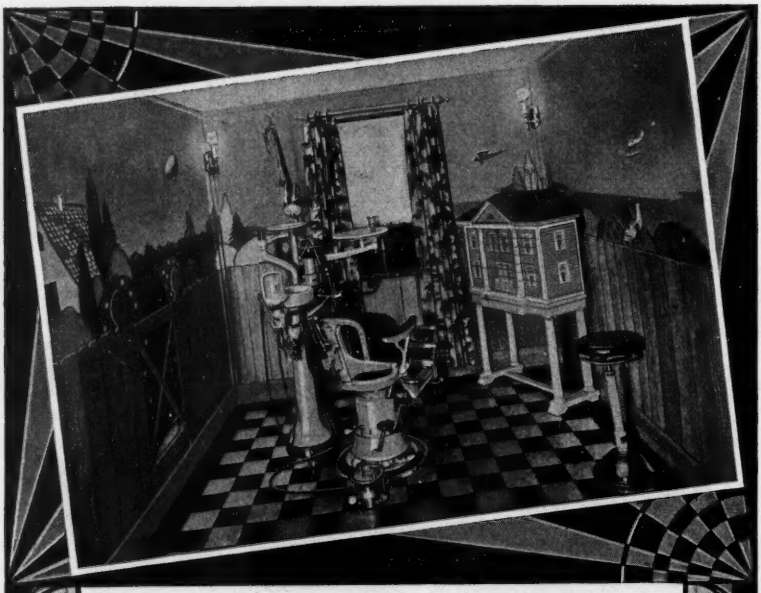

REBUILD YOUR PRACTICE
BY INSTALLING THE JUNIOR ROOM

Millions of patients and millions of dollars can be added to Dental Practice through a source that has formerly been neglected.

There are 46,000,000 growing children in the United States who will require dental services. This juvenile class is now an important source of revenue. It is the class that must be depended upon to rejuvenate dental practice, and provide for that natural increase which every dentist must have.

The Junior Operating Room is the answer.

Ask for brochure "Adding Millions to Dental Practice"

THE AMERICAN CABINET CO.
TWO RIVERS, WISCONSIN

THE AMERICAN CABINET CO., Two Rivers, Wis.
Please send me Circular No. 63-C, "Adding Millions to Dental Practice."

Name .....

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Interesting Pointers *for the* EXODONTIST...

IN the first place, don't get the idea that you Exodontists are the only fellows in this world who pull teeth. Over in Styria, we learn that no less than twelve types of people are in competition ... the village smith, the peasant doctor, his wife, the midwife, the bonesetter, the Chirurgeon, the tooth-drawer, the flayer, the faith-healer, the storekeeper, the pharmacist and the minister. The instruments used are mostly extraction tools, such as the "pelican" or the "key." In Southern Arabia, the teeth are removed in such a way that a small wooden plug is held to the tooth and a heavy stone beaten against it. The Chinese, in olden days, rubbed the gums with a certain powder or paste to loosen the aching tooth, then pulled it out with the help of a lever-shaped instrument.

The Japanese loosen the tooth first with a wooden staff and a hammer and then pull it with the fingers, which they do with admirable skill.

And now that you know *how* to pull teeth, here's the dope on *when* to pull them. According to an English schedule, to get teeth pulled means: On Monday, approaching sadness; on Tuesday, legacy from a distant relative; on Wednesday, loss and shame; on Thursday, success in business; on Friday, confusion in affairs; on Saturday, a discovery of a secret; on Sunday, a love quarrel.

INTERESTING POINTERS FOR THE *PROSTHO*DONTIST

Taking *out* teeth is one thing. Replacing them with life-like, practical dentures is quite another and that's the place in the program where NUFORM TEETH make their appearance. Any Doctor interested in Prosthetic Dentistry will do his practice a real kindness by investigating these finer teeth without delay. Dentists who have already investigated have been astounded and delighted with the many superior features. Order a few sets to test and compare.

Universal Dental Company

48th AND BROWN STREETS, PHILADELPHIA, PA.

A CASTONE Model means an *Accurate* Denture

All the skill and care you put into producing an accurate model can be set at naught by its failure to stand up under the pressure and heat of the vulcanizer. Eliminate that risk by using CASTONE—the new-day model and flasking material that sets with

the *speed* of plaster— the *strength* of stone!

CASTONE sets in 15 minutes into a dense, hard cast, with a marble-like surface. It does not disintegrate in vulcanizing or curing, nor show any appreciable dimensional change. . . . It assures *accuracy*—saves make-overs. . . . and remember, it's

the *original* quick-setting stone

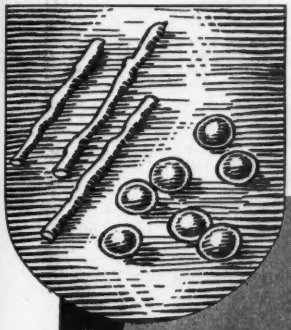
Reduced in Price, too!

Medium can—5 lbs.	$ 1.25
Large can—15 lbs.	3.00
Drum—100 lbs.	13.00

(f.o.b. Todelo, Ohio)

The Ransom & Randolph Company
TOLEDO—OHIO

CHEWING-PILLS AND HONEY STICKS HAVE GIVEN WAY TO A MODERN DENTIFRICE



In the eighteenth century, when dentistry was crude and oral hygiene equally so, chewing-pills and honey sticks sufficed for cleaning the teeth. Liquid soaps, chalks, astringents and gritty toothpastes also have had their day. Built on the experience of the past and embodying the newer principles of oral hygiene—Squibb Dental Cream is the choice of modern dentists.

Squibb Dental Cream is a modern dentifrice—free from harsh, gritty abrasives and other injurious substances. It cleans thoroughly, and goes as far in the safe and effective care of the teeth as a dentifrice can go. Squibb's contains over 50% Squibb Milk of Magnesia—a product used for over 25 years by the Dental Profession in the care of the teeth.

If you send your professional card, we shall be pleased to forward you a complimentary package of Squibb Dental Cream for your own use. Address your request to Dental Department, E. R. Squibb & Sons, 745 Fifth Avenue, New York City.

SQUIBB
DENTAL CREAM
A MODERN DENTIFRICE FOR MODERN DENTISTRY

ACCEPTED AMERICAN DENTAL ASSOCIATION

Along with proper dental care, they need BOTTLED SUNSHINE!

● Poor teeth in children usually mean one of two things. Either the children did not receive the essential factors to *build* sound, well-spaced, even teeth, or they were not given the proper dental care and diet necessary to *keep* them sound.

In the early years when children are building their teeth, they particularly need the factor which helps in calcification—Vitamin D. At this age, they are building *two* sets of teeth at once. Deprived of Vitamin D, their teeth are likely to come in soft and subject to easy decay.

Once their teeth have erupted, dental care is, without question, of first importance in keeping them perfect. And always, along with dental care, comes proper diet!

Are they receiving enough of the important factors which help to preserve the hard tooth structure? This is what dentists must ask.

For the very same factors which help to build sound teeth also help to prevent decay.

The surest safeguard dentists can provide, the most dependable source of the calcifying Vitamin D, is *Bottled Sunshine*—good cod-liver oil.

Outdoor sunshine, the other natural source of Vitamin D, often cannot be depended on, particularly in winter when the weather is bad.

Bottled Sunshine provides children with an abundance of the calcifying factor, Vitamin D. It also contains Vitamin A, which they need for growth and to help build up their resistance against many winter ills.

Both these factors, Vitamins A and D, children obtain in abundance from Squibb Cod-Liver Oil.

Another thing about Squibb's. It comes in the pleasant-tasting Mint-Flavored Oil that older children like.

Recommend Squibb's when you tell mothers to get cod-liver oil for the children. All reliable drug stores carry it, plain or mint-flavored.

SQUIBB • COD-LIVER OIL

PLAIN OR MINT-FLAVORED

This product is acceptable to the Council on Dental Therapeutics of the American Dental Association

THE NATURAL BEAUTY AND TRANSLUCENCY OF HECOLITE APPEALS TO ALL PATIENTS

Your patients, men or women, young or old, desire above all else, natural appearing dentures. They are sensitive about having others know they are wearing "false teeth."

Hecolite appeals, at first sight, to your patients because of its natural, life-like appearance and translucency. And Hecolite retains this natural appearance indefinitely, because it is permanently stable in color and texture.

Besides its natural beauty, Hecolite also possesses other qualities your patients will be quick to appreciate. It is odorless and tasteless, and does not irritate the tender mouth tissues. It is the most compatible material, next to gold or platinum, you can use for sensitive mouths.

From your own standpoint, Hecolite has many advantages. It is suitable for partial, as well as for full dentures. It adheres readily to all metals. It is impervious to acid or alkaline saliva. It does not shrink, but brings out accurately every detail of the impression. It can be successfully repaired if fractured.

For further information, write the American Hecolite Denture Corporation, 94 East 6th Street, Portland, Oregon, or 41 Union Square West, New York City.

YOU DON'T EXPERIMENT WHEN YOU USE HECOLITE

GERMICIDAL KRYPTEX

A translucent, non-discoloring cementing and filling material that wins the admiration of every dentist who uses it

That you too will like it is without question, for who is the dentist who has not longed for a cement that possesses positive germicidal activity, non-discoloration, great strength, stable volume, resistance to masticatory stress and the disintegrating attacks of oral fluids.

It fills many needs in the dental office. It may be used under porcelain facings, crowns, inlays, without fear of discoloration. Gold inlays, crowns, bridges, etc., stay put when cemented with it. It is unquestionably good for filling broken down areas, food retentive and fissured grooves in deciduous teeth and for the cementing of orthodontic bands.

GERMICIDAL KRYPTEX

In One- Three- or Six-Color Packages
$3.00—$7.50 and $15.00 respectively

A Product of

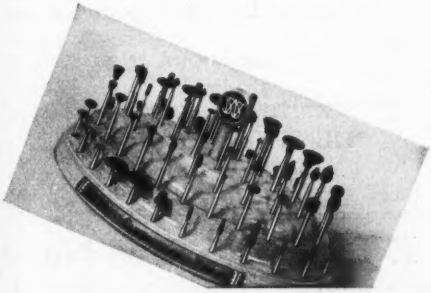
The S. S. White Dental Mfg. Co.

PHILADELPHIA, PA.

Sold by Reputable Dealers Everywhere

S. S. White Carborundum Wheels ~ Disks ~ Points

A pamphlet showing sizes and shapes of all S. S. White Carborundum Tools will be mailed upon request.



The handy one-half gross assortment of S. S. White Carborundum Points in convenient holder.
4 doz. for chuck handpiece.
2 doz. for angle handpiece.

$10.80 complete

You will like them because they ARE precision Tools

The moment you put them to work you will realize why they maintain old friends and are constantly making new. Especially will you like the points and notice with their use an increase in the accuracy of your cavity and jacket crown preparation with less enervating strain on your part, less annoyance to the patient.

S. S. White Carborundum Tools cut swift, clean; need very little pressure; run true, wear evenly; have no soft spots, and do not glaze.

Every S. S. White Disk, Wheel and Point is a thoroughly inspected tool. You will find them uniform always.

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The S. S. White Dental Mfg. Co.

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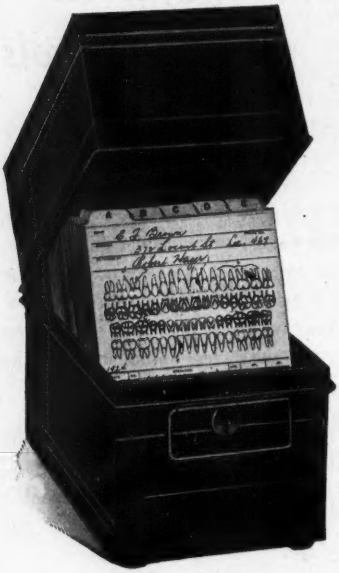
You want a
RECORD SYSTEM
that is accurate, yet easy to keep



The simplicity of the S. S. White Card Index System No. 2 commends it so widely. This is all there is to it.

When you start out the Record Cards (each for an account) are all together. As you open accounts they naturally find their way into one of three classifications:

Active, accounts for which work is under way but not completed.

Passive, accounts for which work is completed and bills mailed but unpaid.

Closed, accounts paid in full.

Each of these classes is indicated by a set of different colored Guide (alphabetical) Cards.

As you send out the bills, you can enter the amounts on a Bill Card, but it's not necessary. You can use the Bill Cards to keep a cash account.

Could anything be simpler, or surer?

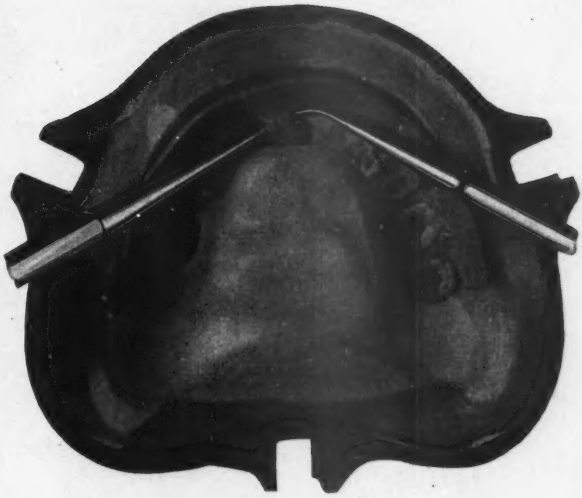
—

WRITE FOR BOOKLET
"DENTAL ACCOUNTS
an easy way to keep them"

S. S. WHITE CARD INDEX SYSTEM No. 2

Outfit consists of 200 Record Cards, 3 sets of alphabetical Guide Cards, 25 Cash or Bill Cards, and 50 Examination Blanks, with follower block, in black metal case with lock and key - - - - - $13.00
Record Cards separately, per 100 - - - 1.75

THE S. S. WHITE DENTAL MFG. CO.
211 South 12th Street
Philadelphia



S.S.White Rubbers Have

Ideal Packing Softness

For Base Plates

No. 10 Maroon
No. 11 Natural Base
No. 12 Brown
No. 13 Gold Base
No. 14 Dark Red
No. 15 Light Red
No. 16 Weighted
No. 18 Black

For Veneering

No. 1 Special Light Pink
No. 3 Light Pink
No. 5 Pink
No. 7 Granular Pink
No. 19 White

For Entire Denture

No. 17 Pink Denture "B"

S. S. White Plastic Rubber for repairing—in convenient 6 oz. Jars

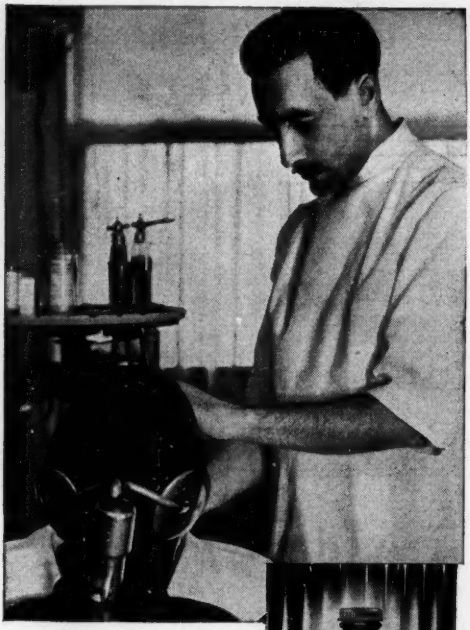
At Your Dealer's

A necessity in dental base plate rubbers is softness. If it isn't soft the rubber will pack into the mold only under a force likely to break away finer details in the plaster and thus ruin the fit of the plate.

But softness may be overdone readily. The rubber can be made so plastic that you have no certainty in manipulation. Too soft rubber is "tacky." It will stick to the packing instrument, drag back from the place you put it, slow up your work.

The ideal softness for present methods of working is a compromise, and that ideal softness is found in the S. S. White Base Plate Rubbers. They "come clean" from the linens and, just as they are, are readily packed in a warmed mold; for a cold mold they need to be warmed.

So used they fill every little detail of the mold; and their almost total absence of shrinkage assures the perfect reproduction of those details in the dense, hornlike plate that proper vulcanization of these rubbers assures.



RAPID *and* SAFE *in germicidal action*

Hexylresorcinol Solution S. T. 37 is being acclaimed by thousands of dentists all over the country as a powerful, non-irritating antiseptic, definitely useful in oral antisepsis.

A constantly increasing record of clinical success shows that dentists are finding it valuable because:

—it destroys bacteria almost instantly

—is absolutely non-poisonous

—is non-irritating and will not harm the most delicate tissue

—is sufficiently analgesic to allay pain

—is deeply penetrative and retains its activity when applied to tissue surfaces.

No existing test is fast enough to measure the germ-killing power of Hexylresorcinol Solution S. T. 37. More than that—laboratory tests show that even when diluted 3 times, it kills germs almost instantly on contact.

You will want to use this rapid, dependable antiseptic at the chair and recommend it to your patients as a twice-daily mouth wash. In 3-ounce and 12-ounce bottles. On sale at all druggists in the United States and Canada—50¢ and $1.25

HEXYLRESORCINOL SOLUTION S.T.37

SHARP & DOHME · PHILADELPHIA · BALTIMORE

DENTAL SCRAP
Refined NOW . . .

means a Check for Christmas!

Here's a way to help pay your Christmas Expenses this year. Simply ship your scrap, anything containing any precious metal... to Hoover & Strong for refining.

If your present accumulation is sent to us now, your check will be forwarded in ample time to be used for Christmas shopping. If you prefer, you may take payment in Hoover Dental Products.

Maximum recovery of your values is assured by accurate refining procedure. The amount of the check proves this.

Write for list of Hoover Dental Products.

WE REFINE: *Teeth or other material containing precious metal; Bridge Scraps; Amalgam Scrap; Grindings; Platinum Scrap; Gold and Silver Scrap; Bench and Floor Sweeps.*

Shipping containers furnished FREE on request.

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DENTAL GOLDS *of* CHARACTER

Golden Rule Refiners and Manufacturers Since 1910

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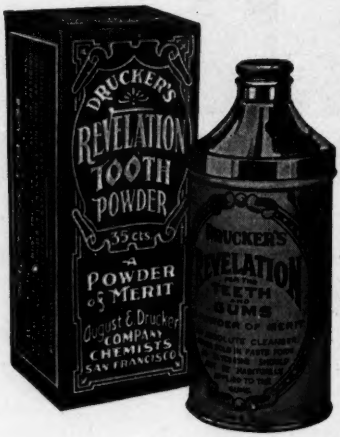


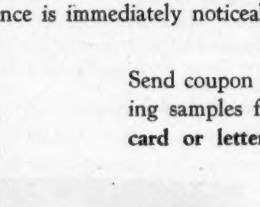
For You

# of a REAL DENTIFRICE!

Have you ever noticed, after brushing your teeth, how some of the substances of the dentifrice tend to cling to the bristles of the toothbrush?

If you haven't, please note this at your next brushing. After noticing this, try REVELATION TOOTH POWDER and see for yourself how clean your toothbrush is thereafter. Many dentists tell us that this is ample proof that REVELATION is a real dentifrice—one that is an absolute cleanser. REVELATION TOOTH POWDER is just what the name implies—use it only a short time and the difference is immediately noticeable—it really is a remarkable dentifrice.

Send coupon for free trial can and testing samples for your patients. **Enclose card or letterhead with your request.**



For Your Patients

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San Francisco, Calif.

☐ Please send me free testing sample.
☐ Samples for my patients.

Dr.....

Address.....

(Designate which is desired)

Another radiographic aid to operative procedure

EASTMAN OCCLUSAL X-RAY FILMS

ABOVE Occlusal view of the upper denture.
BELOW Occlusal view of the lower denture.

IN EVERY dental practice there are often cases in which it is extremely difficult to *accurately* localize the cause of known disturbance. Even the periapical radiographic examination may not show it satisfactorily.

Many such conditions can be quickly visualized in the occlusal radiograph. This view shows: The occlusal relationship of the teeth; impactions; broken off root-tips; foreign bodies; ranulae or stones in the salivary ducts, etc. It also gives valuable information in cases where the mandible has been fractured.

* * * * *

The new Eastman Occlusal Films are supplied in white, machine-made packets; identically the same as the comfortable Eastman Radia-Tized Film packet, except that they are larger ($2\frac{1}{4}$" x 3").

Two types are available: Single-coated *Regular* and double-coated *Super Speed Contrast*; the latter requiring only one-eighth the exposure of the former.

"*Devils, Drugs, and Doctors*"

For a quarter hour of stimulating entertainment, tune in on "Devils, Drugs, and Doctors," broadcast each Sunday evening at 8 o'clock, Eastern Standard Time, over a coast-to-coast network of the Columbia System. These talks, sponsored by Eastman Kodak Company, are given by Howard W. Haggard, M. D., Associate Professor of Applied Physiology, Yale University.

EASTMAN KODAK CO.,
Medical Division,
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Gentlemen: Please send me, regularly, your free publication "Dental Radiography and Photography."

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(POWDERED)

THE PERFECT ADHESIVE FOR DENTURES

Wilson's CO-RE-GA is Used and Prescribed very extensively by full Denture Prosthetists. Holds Dentures Firmly and Comfortably in Place while your Patients are Learning to Wear them ≈ ≈ ≈ ≈

PLEASE SEND FREE SAMPLES FOR PATIENTS . . .

Dr._____

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This Coupon is for Dentists use Only

THE TRIAL SIZE COREGA IS FURNISHED FREE TO DENTISTS ~~ *Mail the Coupon for* YOUR SUPPLY

***For* INLAYS ¾ CROWNS**
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Every batch of SPYCO HARD casting gold is manufactured under strict control, and then scientifically tested before leaving our plant. By employing the latest instruments and equipment we accurately determine the physical properties of all our products. Guesswork is therefore eliminated, and you are assured of "tested" golds with correct and uniform physical properties when you use Spyco Hard and the other Spyco and Tinker golds.

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Order Spyco and Tinker Golds
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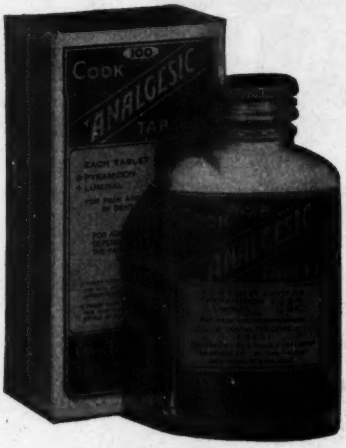
PRE-OPERATIVE CARE



A nervous patient is a constant strain on the operator.

One or two of *Cook Analgesic Tablets*, given half an hour before any dental procedure, assures a tractable and quiet patient.

COOK ANALGESIC TABLETS are sold through the dental supply houses only and exclusively to the dental profession. Further particulars on request.

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TOPANOL not only sterilizes the mucous membrane prior to the insertion of the hypodermic needle, but also anesthetizes the tissues. Thus it eliminates the pain of the needle prick, dreaded by so many patients. TOPANOL finds many other uses in the dental practice where true Painless Operative Dentistry is the aim. Further particulars on request.

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TRADEMARK REG. U.S. AND FOREIGN COUNTRIES
LOCAL ANESTHETIC
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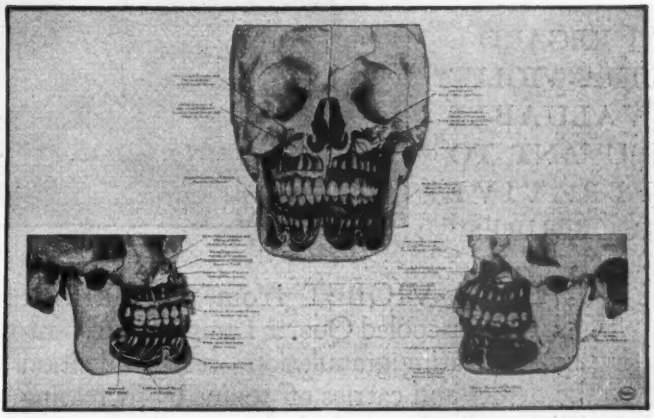
Doctor, will you accept this pathological chart for your office?



Pathological Chart in full color printed on heavy enameled paper, size 20⅜" x 13", suitable for framing.

OVER 20,000 dentists have requested the chart of *Pathological Changes of Hard and Soft Oral Tissue with Normal Nerve and Blood Supply Indicated.* It is remarkably well done by a dental authority.

The illustrations are attractively reproduced in exact colors. Many find this chart is extremely helpful in making explanations to patients.

Only a limited number are available from the final printing. Will you kindly return the coupon at once before the supply is exhausted?

Note to Dental Students:

Students at accredited dental schools may also receive the above chart without cost by sending name, address and school.

THE PEPSODENT CO.
Palmolive Bldg., Chicago, Ill.

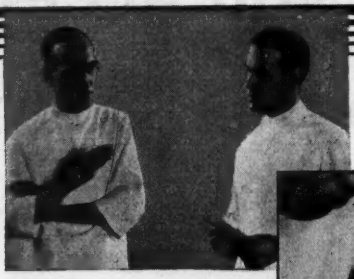
Please send me, without cost, a chart "Pathological Changes of Hard and Soft Oral Tissue with Normal Nerve and Blood Supply Indicated," with the three illustrations in full color on one sheet—suitable for framing.

Name.....

Address.....

City..... *State*.....

FROM ONE DENTIST TO ANOTHER



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"ULTRA-VIOLET from the Burdick Water-cooled Quartz Lamp hastens healing by stimulating granulation—brings nutrition to the tissues and carries off toxins by increasing the blood supply. I find that it relieves pain quickly — stimulates calcium retention — minimizes infection by direct bactericidal action. Then, too, I like the tonic effect and regulation of mineral metabolism secured by general irradiation."

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Dr.....

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For Smooth, Accurate Castings Knapp Inner and Outer Investments

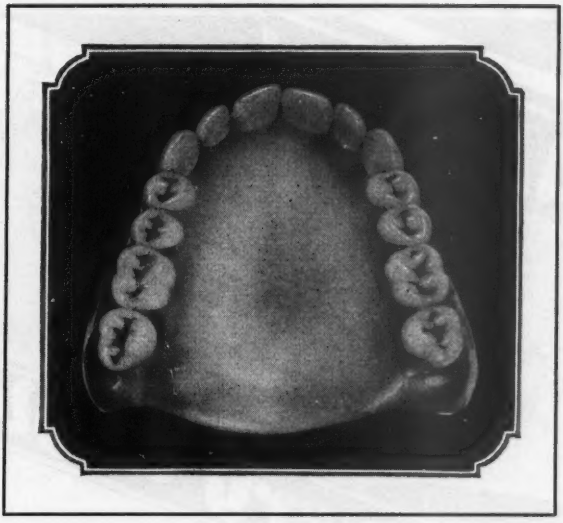
A smooth mold, with wax completely eliminated and no remaining film of carbon, is produced by using Knapp Investments and Knapp technic for investing and eliminating the wax pattern. Knapp Inner Investment gives the mold a smooth, hard surface, reproducing the finest details of the wax pattern. Knapp Outer Investment acts as a reservoir for the water necessary for the rapid elimination process.

KNAPP INNER INVESTMENT, fine and smooth, is used in a thin layer over the wax pattern.

KNAPP OUTER INVESTMENT fills the remainder of the flask. It is coarser, porous, and very resistant to heat.

THE CLEVELAND DENTAL MFG. CO.

CLEVELAND CLEV-DENT OHIO, U. S. A.



Modern Dentures

AT MODERATE COST . . .

Boos Craftsmen are thoroughly familiar with all of the new denture materials, and we are prepared to construct your dentures of any material you wish to use, at prices that enable you to meet present economic conditions.

BOOS TECNECRAFT DENTURE

Hecolite or Alcolite

$7.50 *from set up*

Art-Craft $9.50

The Boos Art-Craft Hecolite or Alcolite denture has stippled gums which are festooned on the labial and carved on the lingual—a beautiful denture at $9.50 from set up. The Boos Tecnecraft denture (Hecolite or Alcolite) has stippled gums but no special carving and festooning—a fine denture at a low cost of $7.50 from set up. Boos dentures of Bakelite and Condensite materials are comparatively low in cost.

Today, more so than ever, you should find Boos Service and Boos Prices unusually attractive. If you are anxious to reduce your laboratory costs without lowering the quality of your restorations, you can solve your problem by sending your cases to Boos.

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Prosthetic Studios

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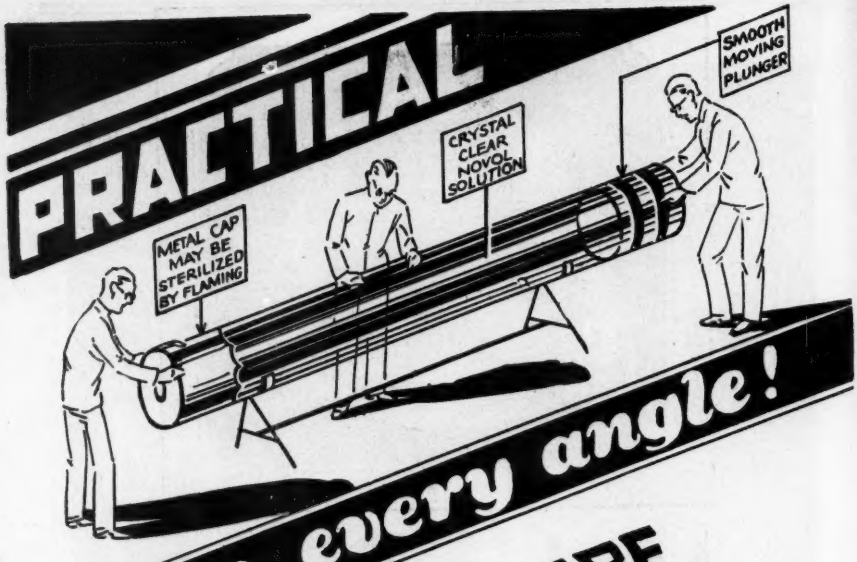

from every angle!

METAL CAP ANESTUBE

for your cartridge syringe..

Cartridge containers are justifiably popular because they make the administration of local anesthetics rapid and simple.

But, never forget—the patient's safety is of primary importance. Use a cartridge container that's *practical* from every angle—that permits flaming of the puncturable diaphragm, thus making possible an unbroken chain of sterile precautions; that contains Novol Local Anesthetic Solution with a high pH and a clinical record of profound anesthesia, minimum toxicity and rapid healing of the wound; smoothly moving plungers, making the highly desirable drop by drop injection possible, without traumatizing the delicate tissue cells.

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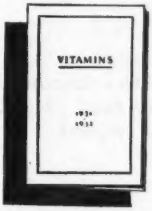
HISTORY proves that anything new—in medicine, astronomy, politics—is rarely seen in the correct perspective. The same is true of vitamins.

Commercial advertising, however sincerely intended, has helped to overemphasize their importance in the general public's mind. Because of this, many professional people have reacted to the other extreme.

With the cooperation of recognized authorities in nutritional research, we have prepared a 43 page booklet, giving an authoritative, brief, yet complete review of the whole subject. It includes charts, x-ray prints, a comparative table of vitamin potencies, selected quotations from many authorities, and much more information of interest to you.

We will gladly send you a copy, if you will mail the attached coupon to us. We think you will agree with us that it helps to place the whole subject of vitamins in proper perspective.



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Gentlemen:
Please mail me a copy of your 43 page booklet, "Vitamins — An Aid to Optimal Health".
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Address .....

It isn't too soon to start

IT IS never too soon to begin educating the child as to the proper care of the teeth. The correct method of brushing the teeth and the use of the right dentifrice can become a habit that will serve the child well throughout life.

The scientifically correct method for cleaning the teeth and promoting mouth health is by detoxification with

DETOXOL PASTE
DETOXOL LIQUID

Detoxification acts on the bacteria of the mouth and their toxins so as to render them harmless.

Detoxol Paste does all that the best toothpaste should do toward mechanically cleaning the teeth, but in addition it detoxifies the mouth.

SPECIAL OFFER

So that you can submit Detoxol Paste to a thorough test in your practice, we will be glad to send 12 full size tubes with our compliments, upon request.

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A New Kerr Product *that is different*

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KERR AGATE

A Stone, ready to separate from the impression in twenty minutes after pouring and ready for use in thirty minutes.

Produces remarkably strong, smooth models with hard surface, with practically no change under heat or pressure.

Mix is easily spatulated and will flow to place with very little vibration, insuring all details of impression.

It is recommended for vulcanite rubbers and synthetic resins. Dentures made on Kerr Agate models are easily cleaned and polished.

Put up in 4-lb. and 10-lb. tin cans and 100-lb. steel drums.

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Mixed Dentinoid ready to be carried to the cavity.

DENTINOID, LILLY

DENTINOID is a medicated, artificial dentin for protecting the dental pulp and filling the canals of pulpless teeth. It protects the pulp in deep-seated cavities, sterilizes the dentin beneath which it is applied, and encourages the deposition of secondary dentin by stimulating the odontoblastic layer of cells. Supplied in 1-ounce glass-stoppered bottles.

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This combination of formaldehyde and cresol is a specific for gangrenous pulps, and uncomplicated dental granulomas and alveolar abscesses. Supplied in 1-ounce glass-stoppered bottles.

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Pyorrhea Astringent is an almost ideal disinfectant for live animal tissue. It should be used after surgical and prophylactic treatment of periodontoclasia. Supplied in 1-ounce glass-stoppered bottles.

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Order Through Your Customary Source of Supply.

All Lilly Dental Preparations Are Made After The Formulas of J. P. Buckley, Ph. G., D. D. S.

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There has been much commendable criticism, of late, in professional publications and elsewhere, of "loose talk" by physicians and dentists as a principal cause of the marked increase in malpractice litigation — particularly where the "mass-selling" plan of professional protection has been called to account.

The emphasis placed on the dangers of "professional" loose talk, however, serves to reveal the advantage of likewise eliminating the discussion of alleged professional errors (or malpractice claims and suits resulting from them) by large armies of insurance agents — particularly those handling multiple lines and contacting the laity as well as the professions. Loose talk is not always confined within the professional ranks.

The Medical Protective Company enjoys a unique position. It employs specially trained representatives, writing professional protection exclusively. It teaches respect for the professional ethics of its patrons. It considers its relations with its clients inviolate. It stresses the importance of keeping the insurance feature in the background — the danger of parading insurance before damage-suit lawyers and juries. It operates with noteworthy success, as a secret but powerful ally to the Doctor in trouble.

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Professional Protection Exclusively

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Kindly send details on your plan of Complete Professional Protection

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11-31

ACCEPTED AMERICAN DENTAL ASSOCIATION

Both Iodent No. 1 for Teeth Easy to Whiten and Iodent No. 2 for Teeth Hard to Whiten have been submitted to the Council on Dental Therapeutics and their compositions and claims found acceptable to the Council.

IODENT

Effective cleaning quality.

Absolute safety of materials and composition.

Textures suited to cleaning the patient's particular kind of teeth.

Flavor and effects refreshing and pleasing to the user.

Thoroughly tested and proven in actual use by both the public and the profession for more than a decade.

These are the thoroughly established qualities of Iodent Tooth Paste which merit your consideration in choosing the tooth paste to recommend to your patients.

THE IODENT COMPANY, DETROIT

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CHRISTMAS MONEY

may be realized by cleaning up your scrap gold.

—it's in your office

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Mail or Bring It to Goldsmith Bros. Today!

Include:

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Our prompt check will cover the full value of your accumulation, including payment for platinum and palladium as well as gold contents.

Ship to Goldsmith for prompt, accurate, complete returns.

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Diet, Mechanics

ORAL HYGIENE

THESE three factors are essential to modern dental therapy.

Proper Nutrition is required for sound tooth and tissue structure.

The Mechanics of dentistry can restore and maintain the functions of the teeth and jaws.

Oral Hygiene can aid in preventing disease by keeping the teeth clean.

A dentifrice can only aid in oral hygiene and no amount of advertising will make it do more. We make no extravagant claims for Arm & Hammer Soda. It will do all you can expect from any dentifrice and is much cheaper.

It is a slightly alkaline powder, free from grit. It has the power to render the insoluble fat and albumin deposits soluble, when they can be readily washed away.

It cleans the teeth.

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Arm & Hammer Bicarbonate of Soda is an effective and economical dentifrice.

Business Established in the Year 1846

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LET Williams send you some extra cash for Christmas in exchange for your scrap gold. Thousands of dentists have formed the habit of sending their scrap to us at this time of the year. They know that we protect their interests to the last penny—that Williams returns are full returns.

All figures are checked and rechecked and with the returns you receive a special Refining Memo showing the details of the whole transaction and exactly how the amount was determined. Because all guesswork and estimating have been eliminated you can be sure that you get the full amount due.

Get this extra Christmas spending money now. Ship your scrap gold to Williams direct or thru your dealer, requesting returns in either cash or Will-Golds as you prefer.

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By ALBERT EDWARD WEBSTER, D.D.S., M.D.S., M.D., F.A.C.D.

Honorary Dean and Professor of Operative Dentistry; Teacher of Operative Dental Assisting, University of Toronto

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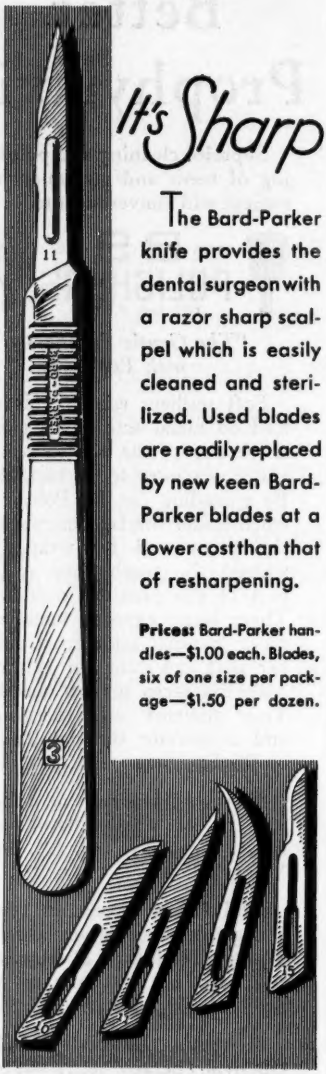

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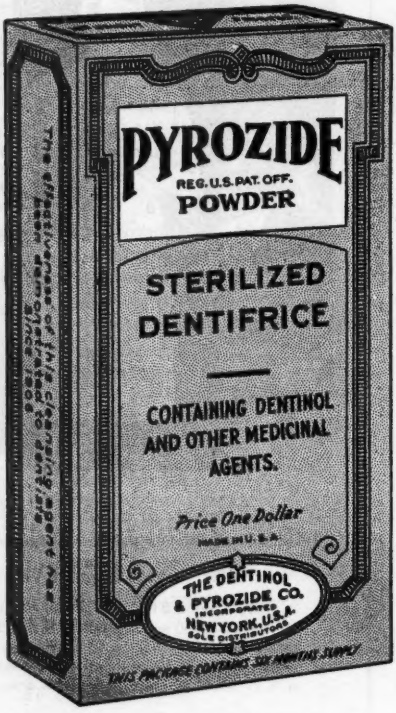

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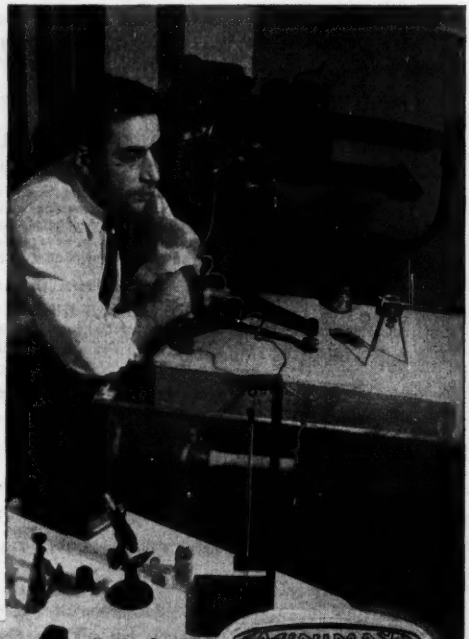

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INDEX TO ADVERTISEMENTS

December, 1931

American Cabinet Co., The.....A- 6
American Dental Association.....A-40, A-42
American Hecolite Denture Corporation.A-11
Angelica Jacket Co.....A-43
Antidolor Mfg. Co.....A-22

Bard-Parker Co., Inc.....A-42
Becton, Dickinson & Co., Inc.....A- 4
Boos, Henry P.....A-27
Bosworth, Harry J.....A-46
Burdick Corporation A-24

Caulk Co., The L. D.....A- 5
Church & Dwight Co., Inc.....A-36
Classified, For Sale, Wanted.....A-47
Classified, Miscellaneous A-47
Cleveland Dental Mfg. Co.....A-26
Colgate & Co.....A- 2
College Directory.....A-48, A-49, A-50, A-51
Columbus Dental Mfg. Co.....A- 3
Cook Laboratories, Inc.....A-22
Corega Chemical Co.....A-20

Dee, Thos. J., & Co.....Third Cover
Dentinol & Pyrozide Co.....A-44
Dentists' Supply Co.....A-54
Detroit Dental Mfg. Co.....A-31
Drucker, August E., Co.....A-18

Eastman Kodak Co.....A-19
French Samuel H., & Co.....A-42

General Baking Co.....A-29
General Electric X-Ray Corporation...A-25
Goldsmith Bros. Smelting & Refining Co. A-35

Hoover & Strong, Inc.....A-17
Horlick's Malted Milk Corporation.....A-46

Iodent Chemical Co.....A-34

Johnson & Johnson.....A-45

Kolynos Company, The.....A- 1

Lavoris Chemical Co.....A-39
Lea & Febiger.....A-38
Lilly, Eli, & Co.....A-32

Medical Protective Co., The.....A-33
Merrell Co., The Wm. S.....A-30
Minimax Co.....A-52
Mizzy, Inc. A-41

Ney Company, The J. M., Dental Golds .....Back Cover
Novocol Chemical Mfg. Co., Inc.....A-28

Oakland Chemical Co., The.....A-43

Pepsodent Co. A-23

Ransom & Randolph Co.....A- 8

Schneider, M. W.....A-45
Sharp & Dohme, Inc.....A-16
Spyco Smelting & Refining Co.....A-21

Squibb, E. R., & Sons.....A-9, A-10

Tailby-Nason Co. A-46

Universal Dental Co.....A- 7

White, S. S., Dental Mfg. Co. A-12, A-13, A-14, A-15
Williams Gold Refining Co.....A-37

Young Dental Mfg. Co.....A-41

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